DEPARTMENT OF AGRICULTURE

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ANHYDROUS AMMONIA

Cargo Tank & Nurse Tank Riser Transfer Area Flow and Pull-Away Protection

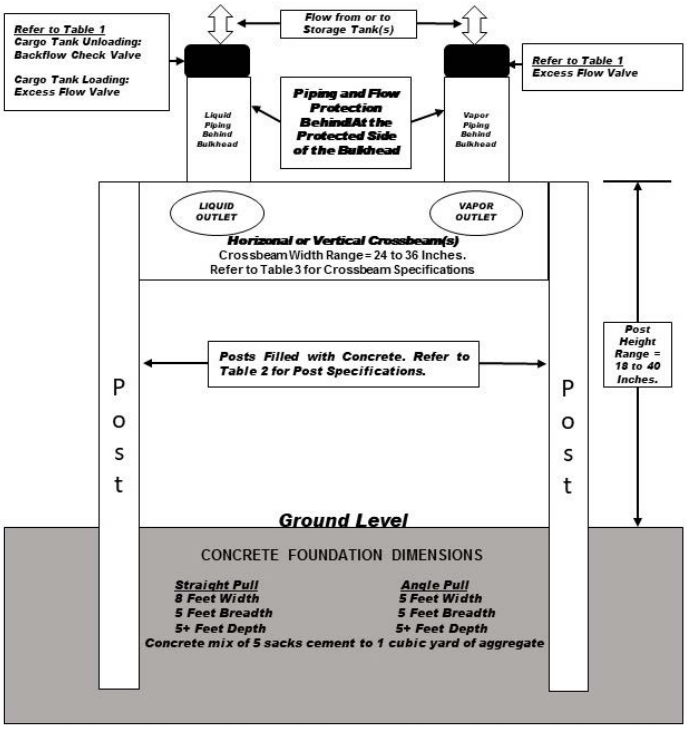
Flow Protection

Backflow check valves, properly sized excess flow valves or other equivalent devices is required, providing flow protection (FP) in the event of a hose rupture or pull away incident. In the storage system transfer areas the following FP is required.

TABLE 1. FP for Each Liquid and Vapor Outlet

Anhydrous Ammonia Transfer Area	Liquid Outlet	Vapor Outlet
Cargo Tank (Transport) Loading	Excess Flow Valve	Excess Flow Valve
Cargo Tank (Transport) Unloading	Backflow Check Valve	Excess Flow Valve
Nurse Tank Loading Riser (i.e. Nurse Tank Risers)	Excess Flow Valve	Excess Flow Valve
Gallon per Minute (gpm) Rating Recommended for Excess Flow Valves	Nurse Tank Loading:70-80	40-50

FIGURE 1. Cargo Tank Transfer Area Bulkhead



Pull-Away Protection

FP devices must be installed in the facility components/piping so that any break will occur on the side of the hose or swivel connection. Pull-away protection by a bulkhead or weakness/shear fittings provides the breaking point in the hose or swivel connection, permitting FP devices and facility components/piping to remain intact during a pull-away incident.

A bulkhead is defined as the entire above and below ground structure that protects FP devices and facility components/piping. Weakness/shear fittings break apart and stop the flow from both sides of the hose or swivel connection during a pull-away event. To afford adequate pull-away protection, FP devices and facility components/piping must be positioned on the protected side of the bulkhead or weakness/shear fittings.

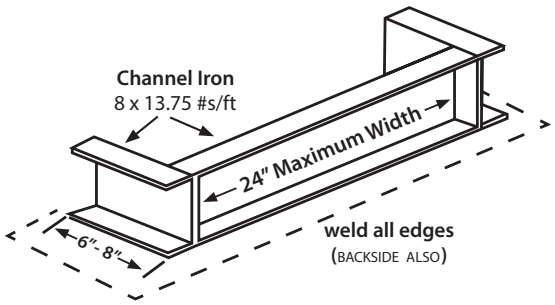
Cargo Tank Transfer Area Bulkhead Pull-Away Protection

To afford adequate bulkhead pull-away protection of FP devices and facility components/piping the operation of the bulkhead must NOT be impeded and remain fully intact during a pull-away incident. Depending on the direction of the pull-away, a cargo tank (transport) transfer area bulkhead must withstand a pull of at least 5,000 to 10,000 pounds.

Another consideration in the design of a bulkhead is the reduction factor. The reduction factor takes into account the construction, environmental, material specification that relates to the construction of a bulkhead, and its ability to withstand a pull-away incident. A reduction factor of .66 is used for the bulkhead design and material specifications. Refer to Figures 1 and 2 of bulkhead designs for a cargo tank transfer area. Refer to Tables 2 to 3 for bulkhead material specifications.

Bulkhead pull-away protection may not be required when the cargo tank transfer area is equipped with suitable weakness/shear fittings capable of breaking on the side of the hose or swivel connection. Follow the manufacturer's specifications for the installation of shear/weakness fittings to avoid impeding the operation of the pull-away protection.

FIGURE 2. Cargo tank transfer area bulkhead welded on a skid mounted storage tank unit.



Note: For details concerning pipe welding review MDA Fact Sheet "Anhydrous Ammonia Pipe Welding and Welder Qualifications".

Materials Specification Tables for Bulkhead Construction

The following tables provide specification options for the construction of a cargo tank transfer area bulkhead.

TABLE 2. Cargo Tank Tranfer Area Bulkhead Posts

H =	A36 Pipe Size	CHANNEL IRON	
18"	3"	8" @ 18.75 #s/ft.	8" @ 11.5 #s/ft.
24"	4"	10" @ 30.0 #s/ft.	10" @ 20.0 #s/ft.
40"	5"		

TOP VIEW
Pull-Away Direction - Up to an angle of 45°

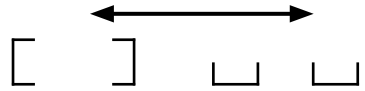
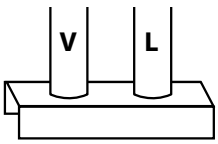


Table 3. Cargo Tank Transfer Area Bulkhead Crossbeams(s) or CB(s)

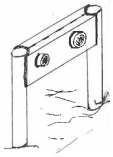
W =	CHANNEL IRON	
	Vertical piping/ crossbeam	Horizontal piping/ crossbeam
24"	1 CB of 8" @ 11.5 #s/ft.	2 CB of 8" @ 11.5 #s/ft.
30"	1 CB of 8" @ 11.5 #s/ft.	2 CB of 8" @ 13.75 #s/ft.
36"	1 CB of 8" @ 11.5 #s/ft.	2 CB of 8" @ 18.75 #s/ft.

Front View

Pull-Away Direction also vertical piping/crossbeam



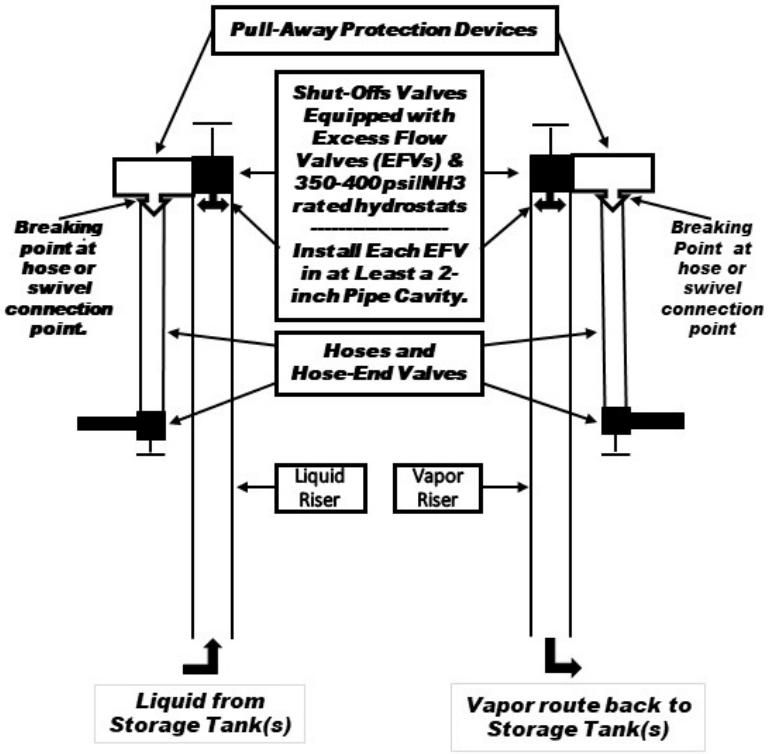
All horizontal directions also horizontal piping/crossbeam



Nurse Tank Riser Transfer Area Pull-Away Protection

Shear/weakness fittings are the most effective means of pull-away protection for nurse tank riser transfer areas. This is due to the difficulty of installing and maintaining effective pull-away protection via a bulkhead. Follow the manufacturer's specifications for the installation of shear/weakness fittings to avoid impeding the operation of the pull-away protection. Refer to Figure 3 for details.

FIGURE 3. Nurse Tank Riser Transfer Area



Want More Information or Have Questions

Contact the Minnesota Department of Agriculture at 651-201-6275 or email: Ed.Kaiser@state.mn.us.