

Anhydrous Ammonia Cargo Tank/Nurse Tank Riser Area Pull-Away Protection - Construction and Design Specification Requirements

Cargo Tank and Nurse Tank Riser Flow Protection Devices and Function of Pull-Away Protection

Backflow check, excess flow, and emergency shutoff valves provide flow control protection (FCP) in the event of a hose rupture or pull away incident. In the storage system cargo tank (transport) unload area, a backflow check valve is required for each liquid line outlet and a properly sized excess flow valve for each vapor line outlet. Each liquid and vapor riser line outlet (nurse tank loading) must be equipped with a properly sized excess flow valve.

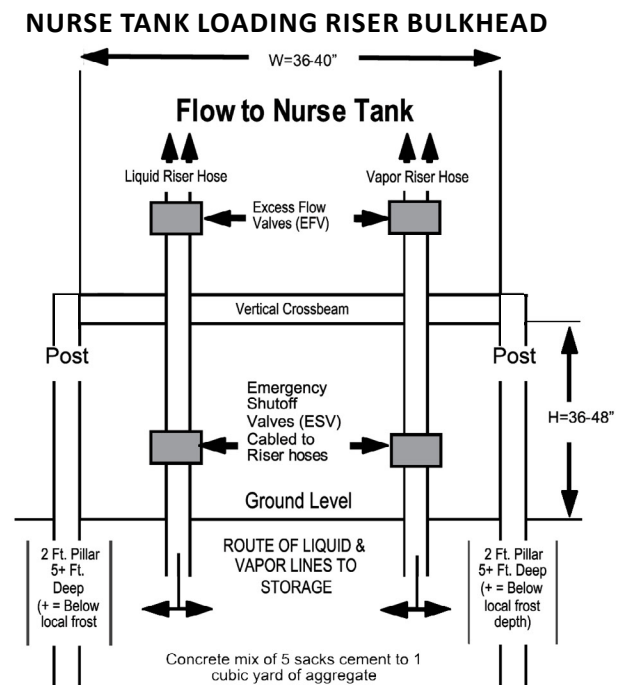
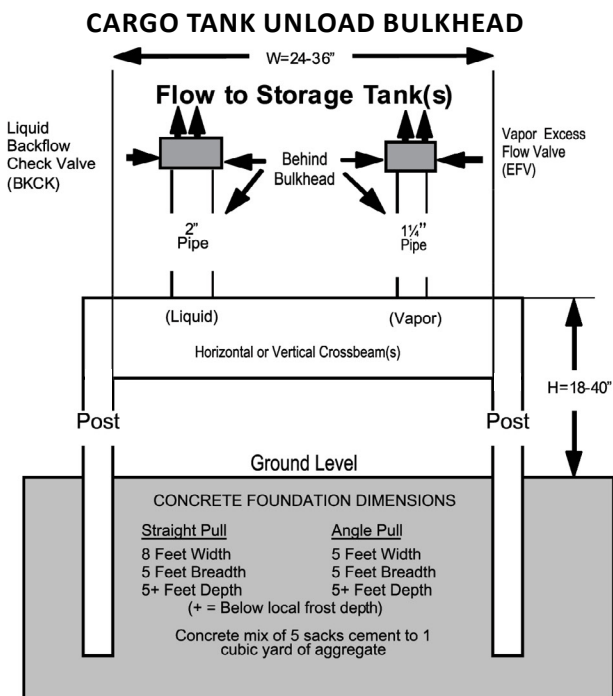
FCP devices must be installed in the facility piping so that any break will occur on the side of the hose or swivel connection. This is where pull-away protection provided by a bulkhead or weakness/shear fittings for the cargo tank unloading and nurse tank riser areas come into play. A bulkhead is defined as the entire above and below ground structure that protects system piping and FCP devices. Weakness/shear fittings break apart and stop the flow from both sides of the connection during a pull-away event. To afford adequate pull-away protection, FCP devices, valves, piping, and other storage system appurtenances must be positioned on the protected side of the bulkhead or weakness/shear fittings.

EXCEPTION: Because of the difficulty of employing a bulkhead for protecting nurse tank riser excess flow valves, automatically operating emergency shutoff valves protected by a bulkhead or shear/weakness fittings must supplement the riser excess flow valves.

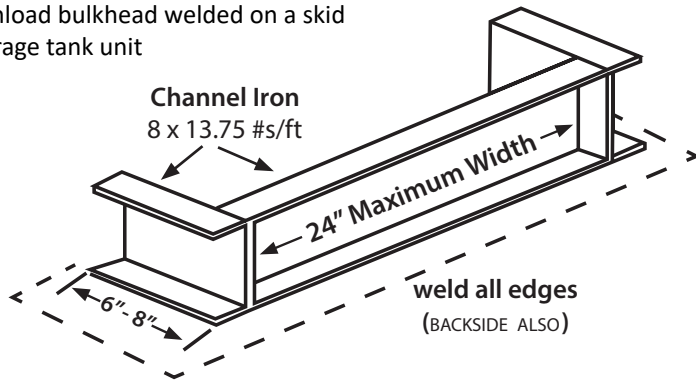
Design Considerations

To afford adequate protection of system piping and FCP devices, the bulkhead must remain fully intact during a pull-away incident. Depending on the direction of the pull-away, a truck unload area bulkhead must withstand a pull of approximately 5,000 to 10,000 pounds in contrast to 2,000 to 3,000 pounds for a riser area.

Another consideration in the design of a bulkhead is the reduction factor. The reduction factor takes into account some of the construction, environmental, or material specification that relates to the construction of a bulkhead, and its ability to withstand a pull away. A reduction factor of .66 is used in determining the material specifications listed in the Tables 1 through 4.



Cargo tank unload bulkhead welded on a skid mounted storage tank unit



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

Materials Specification Tables for Bulkhead Construction - The following tables provide specification options for the construction of a bulkhead for either a truck unload or nurse tanker area.

Table 1: Cargo Tank Unload Area 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: Nurse Tank Riser Area Posts

H =	A36 Pipe Size	CHANNEL IRON	
36"	3"	8" @ 18.75 #s/ft.	8" @ 11.5 #s/ft.
48"	4"	10" @ 30.0 #s/ft.	10" @ 20.0 #s/ft.

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

Table 2: Cargo Tank Unload Area 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

Table 4: Nurse Tank Riser Area Crossbeam or CB

W =	CHANNEL IRON	
	Vertical piping/crossbeam	
36"	1 CB of 6" @ 8.2 #s/f	
40"	1 CB of 6" @ 8.2 #s/f	

FRONT VIEW
Pull-Away Direction - All horizontal directions

When Bulkhead Protection May Not Be Required

A bulkhead may not be required when the cargo tank or nurse tank riser piping is equipped with suitable weakness or shear fittings capable of breaking on the side of the hose or swivel connection. In the event of a pull away incident, the weakness or shear fittings would only require sufficient bracing, as specified by the manufacturer, to maintain the condition of the system piping and other FCP devices.

Time Table For Compliance

The installation of additional flow protection devices and bulkhead protection must be completed within two years of the effective date of Minnesota Rules, Part 1513.0200, or by September 2, 1998.

For more information, contact the Minnesota Department of Agriculture at 612/201-6275 or e-mail ed.kaiser@mda.state.mn.us