	Form Title:	<p align="center"><b>ENGINEERING BULLETIN</b></p>	Document #:	<p align="center"><b>EB-03-03</b></p> <small>(Form: DEF-003A-1)</small>
				Revision:
	Document Title:	<p align="center"><b>Hydraulic Valve System and Plumbing Schematic</b></p>	Date:	<p align="center"><b>March 3, 2021</b></p>
				Page:

**Description of Bulletin:** This bulletin is intended as a general guide and offers basic plumbing schematics for typical stainless hydraulic valve systems for use on over-the-road cargo tankers. A typical Cargo Tank Hydraulic Systems consists of multiple components that are designed to work in conjunction with each other. It is imperative that this system is configured to ensure it meets all regulatory, safety and performance requirements.

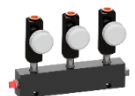
**Bulletin Instructions:** Several configurations are shown on the following pages and each one may satisfy a certain application better than the others. It is the responsibility of the tank manufacturer and owner/operator to fully understand the specific configuration utilized.

A typical Cargo Tank Hydraulic System consists of the following components:

**Hydraulic Pump (hand jack/hand pump)** – Used to manually create hydraulic pressure to actuate Stop Valves and Vapor Valves. The Betts Hydraulic Pump includes a pressure safety bypass that protects the system from over-pressurization. Ensure fluid is clean since debris in hydraulic lines such as shavings, thread sealing compound or PTFE tape will likely lead to failure of pump or valves.



**Hydraulic Distributor** – Used to manually select which Stop Valve or Vapor Valve actuates when Hydraulic Pump is operated. A closed Control Valve blocks the flow of hydraulic fluid from the Hand Pump to the Primary Stop Valve yet does not inhibit flow from Primary Stop Valve back to the Hand Pump. This unique and critical feature is required to ensure the proper function of the emergency shut-down system and protects the system from over-pressurization due to possible hydraulic fluid thermal expansion. **Note:** *Never install ball valves or standard shut-off valves in the hydraulic system.*



**Remote Shutdown** – The Frangible is a mechanically activated single-use emergency shut-down feature that, when mounted and plumbed correctly, satisfies US DOT 49CFR§178.345-11(b)(1)(i).

**Fusible Plug** - The Fusible Plug is a single-use thermal protection device and that, when mounted and plumbed correctly, satisfies US DOT 49CFR§178.345-11(b)(1)(iii), 49CFR§178.341-5(a) and CSA B620-09 clause 5.6.12.3(e).




**Primary Self Closing Stop Valve** – Located at the bottom of the cargo tank and is the primary valve used to load or unload product from the tank.

**Vapor Recovery Valve** – Located in the top of the cargo tank and is in communication with the vapor space. This valve is used to facilitate the transfer of displaced air/vapor during loading and unloading.

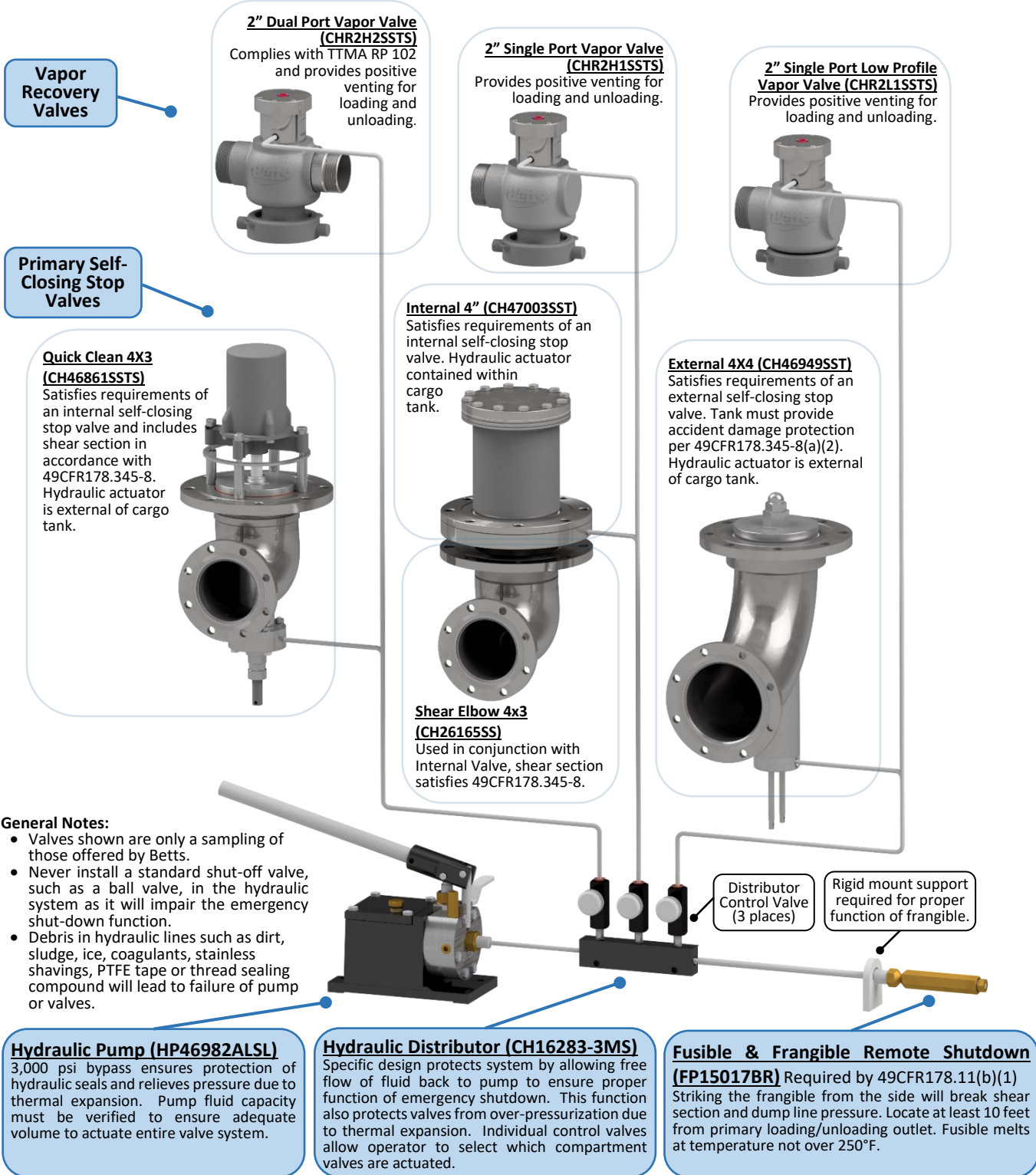



**Hydraulic Lines and Fittings** – Lines and fittings must be chosen with an appropriate maximum working pressure rating, which is recommended to be 1.5 times the system MAWP.

**Configuration 1:** (Shown in Figure 1) This configuration utilizes the standard CH16283 Hydraulic Distributor and is for a multi-compartment cargo tank. Each compartment's Primary Stop Valve and Vapor Valve work in unison. To actuate a specific compartment's valves, turn the corresponding Hydraulic Distributor Control Valve counterclockwise to open the line. Then, pump the Hydraulic Pump to charge the system. To close the Primary Stop Valve and Vapor Valve, release the Pressure Release Handle on the Hydraulic Pump and then reset all Hydraulic Distributor Control Valves to the closed position by turning clockwise. In an emergency, the Fusible/Frangible can dump the hydraulic pressure and close all valves. Note: For this configuration, Vapor Valves cannot be opened independently without also opening the same compartment's Primary Stop Valve.

	Form Title:	<b>ENGINEERING BULLETIN</b>	Document #: <b>EB-03-03</b> <small>(Form: DEF-003A-1)</small>
	Document Title:	<b>Hydraulic Valve System and Plumbing Schematic</b>	Revision: <b>2</b>
			Date: <b>March 3, 2021</b>
			Page: <b>2 of 5</b>

**Figure 1** (Configuration 1)

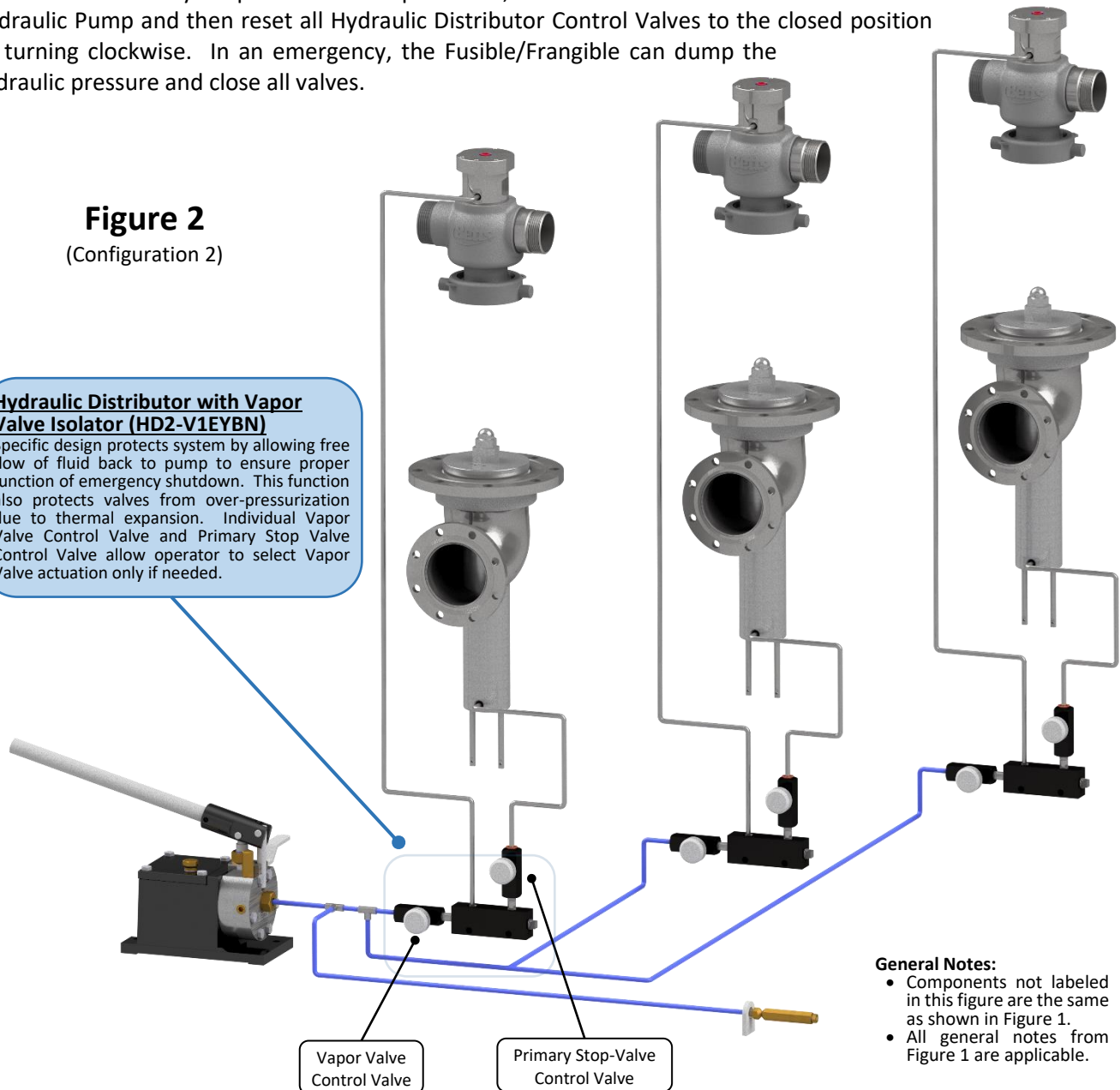


	Form Title:	<p style="text-align: center;"><b>ENGINEERING BULLETIN</b></p>	Document #: <b>EB-03-03</b> <small>(Form: DEF-003A-1)</small>
	Document Title:	<p style="text-align: center;"><b>Hydraulic Valve System and Plumbing Schematic</b></p>	Revision: <b>2</b>
			Date: <b>March 3, 2021</b>
			Page: <b>3 of 5</b>


**Configuration 2:** (Shown in Figure 2) This configuration utilizes the Hydraulic Distributor with Vapor Valve Isolator (HD2-V1EYBN) and is for a multi-compartment cargo tank. Each compartment's Vapor Valve can be opened independently of the Primary Stop Valve, but for safety reasons, the Primary Stop Valve cannot be opened without the corresponding compartment's Vapor Valve also being opened. The specific compartment's Vapor Valve is actuated by turning the corresponding Vapor Valve Control Valve counterclockwise and pumping the Hydraulic Pump to charge the system. To actuate both the Vapor Valve and Primary Stop Valve, turn the corresponding Vapor Valve Control Valve and Primary Stop Valve Control Valve counterclockwise and pump the Hydraulic Pump. To close the Primary Stop Valve and Vapor Valve, release the Pressure Release Handle on the Hydraulic Pump and then reset all Hydraulic Distributor Control Valves to the closed position by turning clockwise. In an emergency, the Fusible/Frangible can dump the hydraulic pressure and close all valves.

**Figure 2**  
(Configuration 2)

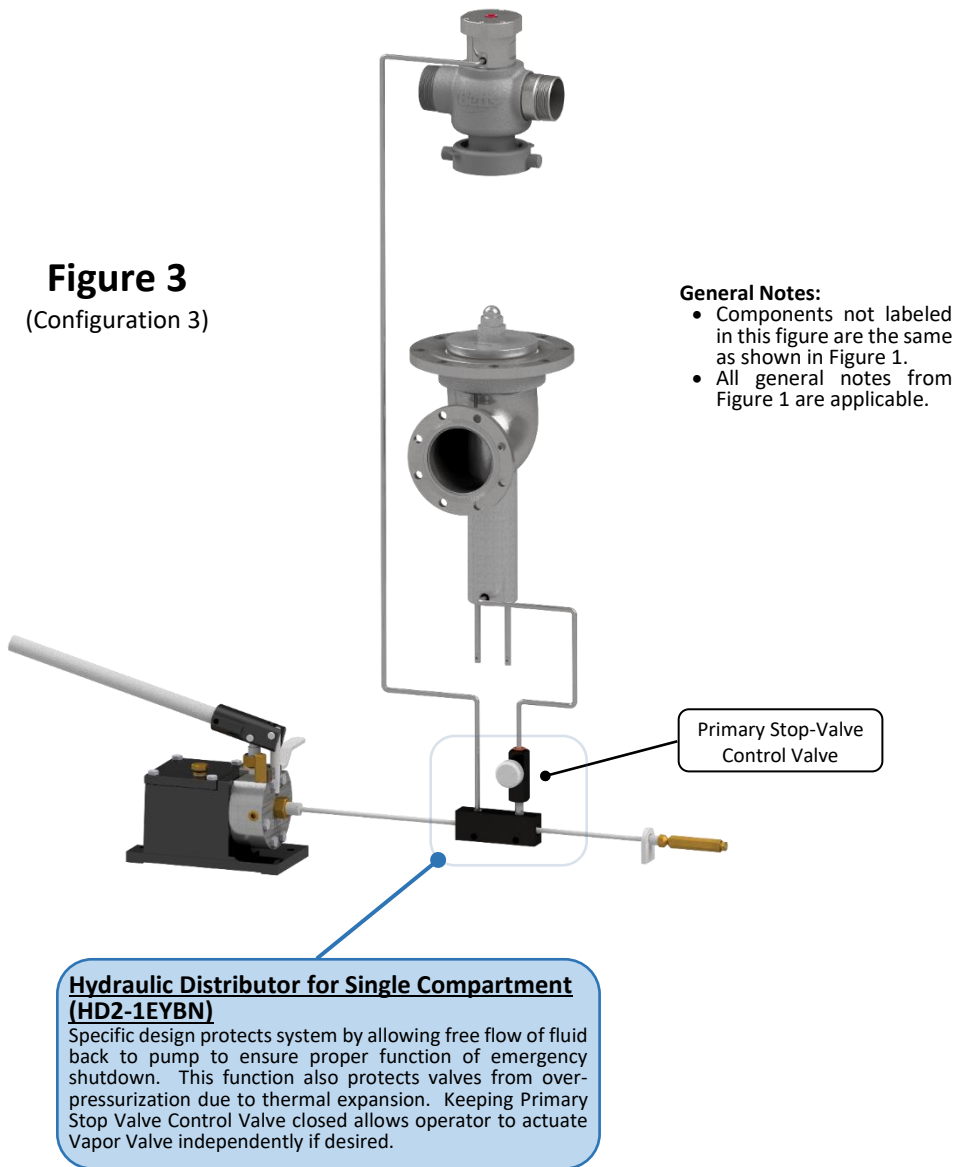
**Hydraulic Distributor with Vapor Valve Isolator (HD2-V1EYBN)**  
Specific design protects system by allowing free flow of fluid back to pump to ensure proper function of emergency shutdown. This function also protects valves from over-pressurization due to thermal expansion. Individual Vapor Valve Control Valve and Primary Stop Valve Control Valve allow operator to select Vapor Valve actuation only if needed.




- General Notes:**
- Components not labeled in this figure are the same as shown in Figure 1.
  - All general notes from Figure 1 are applicable.

	Form Title:	<p align="center"><b>ENGINEERING BULLETIN</b></p>	Document #:	<p align="center"><b>EB-03-03</b></p> <small>(Form: DEF-003A-1)</small>
				Revision:
	Document Title:	<p align="center"><b>Hydraulic Valve System and Plumbing Schematic</b></p>	Date:	<p align="center"><b>March 3, 2021</b></p>
				Page:

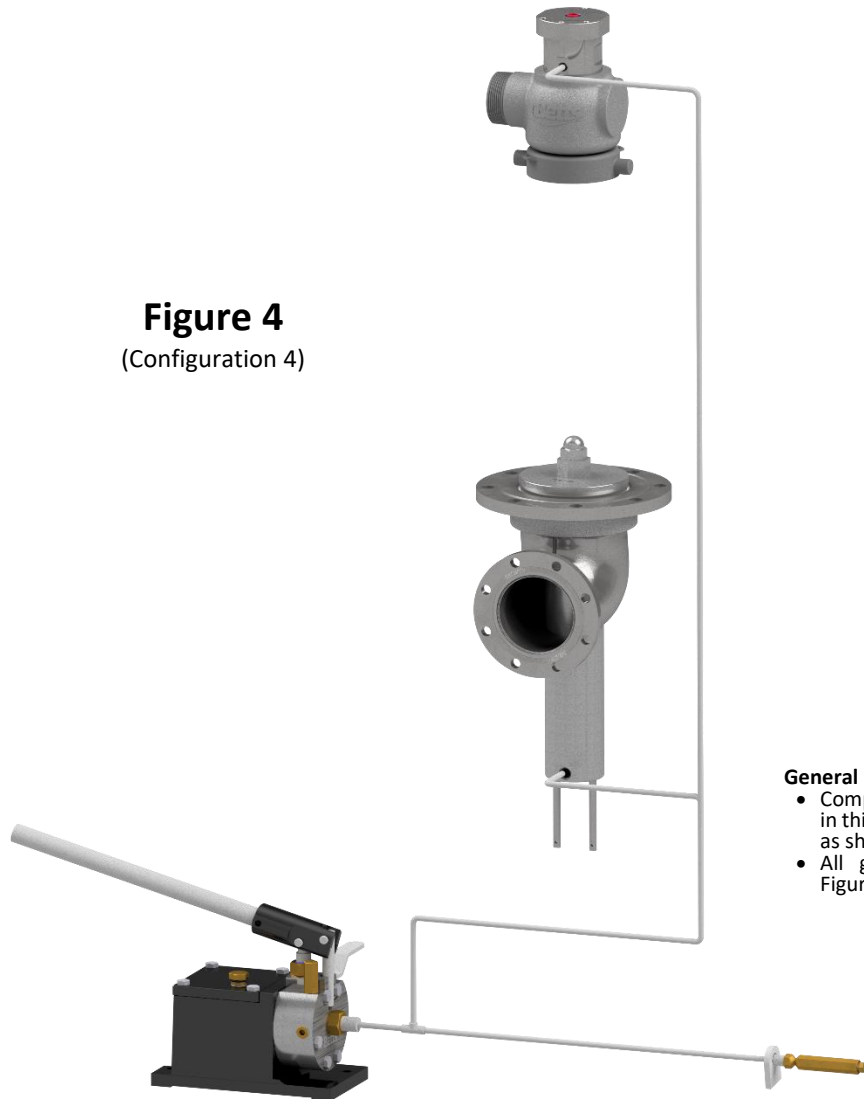
**Configuration 3:** (Shown in Figure 3) This configuration utilizes the Hydraulic Distributor for Single Compartment (HD2-1EYBN) and is for a single compartment cargo tank. The Vapor Valve can open independently of the Primary Stop Valve, but for safety reasons, the Primary Stop Valve cannot be opened without the Vapor Valve also being opened. The Vapor Valve can be actuated independently by only pumping the Hydraulic Pump to charge the system. To actuate both the Vapor Valve and Primary Stop Valve, turn the Primary Stop Valve Control Valve counterclockwise and pump the Hydraulic Pump. To close the Primary Stop Valve and Vapor Valve, release the Pressure Release Handle on the Hydraulic Pump and then reset the Control Valve to the closed position by turning clockwise. In an emergency, the Fusible/Frangible can dump the hydraulic pressure and close all valves.



	Form Title:	<b>ENGINEERING BULLETIN</b>	Document #:	<b>EB-03-03</b> <small>(Form: DEF-003A-1)</small>
				Revision:
	Document Title:	<b>Hydraulic Valve System and Plumbing Schematic</b>	Date:	<b>March 3, 2021</b>
				Page:

**Configuration 4:** (Shown in Figure 4) This configuration is for a single compartment cargo tank. No hydraulic distributor is needed. Vapor Valve and Primary Stop Valve open at same time when pump is charged. To close the Primary Stop Valve and Vapor Valve, release the Pressure Release Handle on the Hydraulic Pump. In an emergency, the Fusible/Frangible can dump the hydraulic pressure and close both valves.

**Figure 4**  
(Configuration 4)



**General Notes:**

- Components not labeled in this figure are the same as shown in Figure 1.
- All general notes from Figure 1 are applicable.