The Chemguard Bladder Tank is one component in a balanced pressure foam proportioning fire protection system. It requires no external power other than water pressure to ensure correct operation. The bladder tanks are designed and constructed in accordance with the latest revisions to ASME Code, section VIII for unfired pressure vessels with a working pressure of 175 psi and are tested to 1.3 times this pressure.

**INSTALLATION**

Upon receipt of the Chemguard Bladder Tank and before installation, check completely around the tank, trim valves and piping, etc. for any damage that may have occurred during shipment. Please read through this complete manual prior to starting any installation.

When installing a vertical bladder tank, please consider the possibility that in the future, the bladder or PVC center tube may require removal. Remember that it requires access from above the tank in order to remove the piping and the bladder. If possible, it should be installed in an area that is at least twice as high as the tank or a roof hatch should be installed above the tank.

When installing a horizontal style bladder tank, it also requires vertical clearance as well as a clear area at one end, which should be at least twice as long as the tank. Access through double doors is acceptable. Place the tank in the desired location and anchor to the floor. If unable to leave an area around the tank(s) as above, endeavor to have at least 3 feet clearance above and around the tank from the nearest wall or obstruction. This provides "working space" around the tank for connecting the system pipe work to the tank.

**CAUTION**

Do not weld on the bladder tank shell. Welding temperatures may cause damage to the elastomeric rubber bladder inside the tank. Chemguard supplies only the equipment listed on the Chemguard sales order. All interconnecting piping, valves or fittings not specifically mentioned are not supplied.

Figure 1: shows a typical piping arrangement utilizing a vertical bladder tank with one proportioning controller as well as all necessary valves and components.

Figure 2: shows a typical piping arrangement utilizing a horizontal bladder tank with one proportioning controller as well as all necessary valves and components.

**WARNING**

Please refer to the ASME label installed on the bladder tank for the recommended working pressure. As standard, Chemguard bladder tanks are ASME coded for 175 psi working pressure. Also check the label on the tank showing the tank capacity and type of foam concentrate to be used in the tank. The Chemguard bladder tank does not come equipped with any pressure relief device. Chemguard does not supply this device because the water supply pressure, flow capacity, and full system design details must be known before a pressure relief device is installed. It is the responsibility of either the owner or the Fire Protection Engineer designing the system to establish whether or not the relief device is required.

Figure 3: shows a two-bladder tank (one main, one reserve) system.

Figure 3: illustrates the reserve tank manually valved off from the system. Once the primary tank has been expended it can be manually isolated from the system and the reserve tank brought "on line" by opening the manual valves to/from the tank and closing the manual valves to/from the main tank. This gives continuous coverage by the foam protection system over the hazard area. The main tank can now be recharged with foam concentrate while it is isolated from the system.

Figure 4: illustrates the same system as figure 3.
but using horizontal tanks. It is possible to cover different risk areas using the same bladder tank. Figure 5 & 5A depict a single vertical tank supplying three different risk areas through different proportioning controllers. In this type of open discharge device installation, it is normal that each area would have its own detection system.

**DESIGN NOTE**

When designing the piping arrangement to the bladder tank, it is most important to have the pressure of the foam concentrate within 2 psi of the incoming water pressure when it arrives at the same proportioning controller. The combined total equivalent length of pipe, fittings and valves in both the water supply inlet piping and the foam concentrate discharge piping must not exceed 50 equivalent feet (15.2 meters). This will allow both pipes to be the same size as the foam liquid inlet to the proportioning controller. If the total equivalent length exceeds 50 feet (15.2 meters), please call the engineering department at Chemguard for assistance.

When installing the water feed pipe to the bladder tank, ensure this water supply is installed into the system upstream from the proportioning controller. In accordance with NFPA standards, a strainer is required in the foam concentrate line from the bladder tank to the proportioning controller. When the system is used with Chemguard manufactured foam concentrates, it is our opinion that this strainer is not necessary or desirable due to the increased friction loss.

There is approximately 1 psi of friction loss incurred within the bladder tank itself as the foam concentrate is pushed out of the bladder into the concentrate piping.

When using Chemguard standard 1%, 3% or 6% AFFF concentrates, all hydraulic flow calculations are based on water flow rates through the pipe and fittings. Because of their high viscosity, when using the 3%-6% or the 3% type of alcohol resistant AFFFs, hydraulic calculations for the piping from the bladder tank to the proportioning controller are very critical. Please refer to the separate data sheet "Friction Loss Data for Alcohol Resistant AFFF".

When calculating the hydraulics of the foam fire protection systems, please refer to the two graphs on the proportioning controller’s data sheet, which refer to "Friction Loss Curves" and "Minimum Inlet Pressure Versus Flow".

**DESIGN NOTE**

**Proportioning Controllers**

Check the approved flow rate(s) of the controller(s) with the particular type of foam concentrate being used in the system. REMEMBER: Alcohol Resistant AFFF type concentrates have higher low-end approved flow rates than the proportioning controllers with the standard AFFFs. Install the proportioning controller(s) in the main distribution supply pipe that feeds the system.

**NOTE:** Refer to the proportioning controller data sheet regarding the length of straight pipe upstream and downstream from the controller. This straight pipe minimizes the turbulence inside the controller, which gives more accurate proportioning.

When installing the proportioning controller(s) higher in the system than the top of the bladder tank, REMEMBER to calculate for the friction loss due to head pressure from the bladder tank to the controller foam concentrate inlet.

When using a bladder tank with a proportioning controller(s) in a closed head foam fire protection system, a number of discharge sprinkler heads will have to open before the necessary flow rate is reached through the proportioning controller. This allows the correct proportioning of the foam concentrate into the water stream. At flow rates below the recommended approved rate, very lean or no proportioning of the foam concentrate into the water stream will take place. The size of the proportioning controller is the controlling factor. The larger the controller, the higher the low-end flow rate. Subsequently, more heads must open before accurate proportioning is achieved.

**INSTALLATION INFORMATION**

Once the tank has been located in the correct position and anchored to the floor, it can be piped into the system. On both the horizontal and the vertical style tanks, the water inlet into the tank is located approximately midway down the side of the tank. Unscrew the plug and connect the water supply piping.

**DESIGN NOTE**

**Automatic Hydraulic Actuated Valve**

This valve is used in the foam concentrate line to prevent foam concentrate from entering into the proportioning controller when the system is not in operation. When installed correctly, this valve will
open automatically and allow the foam concentrate into the controller. The valve is normally in the closed position and is activated by water pressure. In normal installations when the system is activated, a small 1/4" or 3/8" ID copper tube feeds water to the hydraulic valve from the alarm side of either a deluge or an alarm valve.

For further information on this valve, please refer to the data sheet "Hydraulic Actuated Concentrate Control Valve".

If an electric driven concentrate control valve is required, please contact the engineering department at Chemguard for further information. If supplying only one proportioning controller from the bladder tank the foam system is of a "Deluge" type system, and the proportioning controller is installed higher in the system than the top of the bladder tank. An automatic normally closed concentrate control valve is not necessary on the foam concentrate line. If the proportioning controller is installed below the top of the tank, siphoning of the foam concentrate out of the tank may take place. In this instance, an automatic concentrate control valve should be installed.

If the foam system is of the "Closed Head" type, it is recommended that a normally closed concentrate control valve be installed in the foam concentrate line going to the proportioning controller.

It is suggested that a union or a grooved coupling be installed between the foam concentrate swing check valve and the inlet to the proportioning controller. This will facilitate servicing of the controller if necessary.

Chemguard also suggests installing a pressure gauge in the water line near the water inlet to the proportioner as well as one in the foam concentrate line near the foam concentrate inlet. This will facilitate system troubleshooting should be a problem with correct proportioning.

Figure 3: shows one bladder tank supplying three different systems. The water supply to the tank is supplied from each system. The check valve on each water supply system is necessary, as this will prevent water from being back fed into a system that has not operated.

The water supply feeding the bladder tank can be taken from a constant pressurized water supply source. It will not damage the bladder tank if left under constant pressure. The foam concentrate will be forced out of the tank but not into the proportioning controller because of the normally closed automatic valve. Even on a closed head system, after the piping gridwork has been primed with foam solution, the automatic valve should be closed and left in the normally closed position. Upon system actuation, water from the alarm valve will pressurize the valve and cause it to open allowing the foam concentrate to flow into the controller.

GENERAL INFORMATION

Piping Materials: Standard schedule 40 black steel, stainless steel, or brass pipe is suitable for use with Chemguard manufactured AFFF types of foam concentrates. Galvanized pipe is not suitable for use with AFFF concentrate. AFFFs have a solvent included in their formulation which may dissolve standard pipe joint compound (pipe dope) normally used with plain water sprinkler systems. When installing a foam water fire protection system using AFFF concentrates, it is recommended that where the concentrate or the solution is in contact with any pipe joints etc., a quality Teflon TM tape in accordance with MIL-T-27730 or a Teflon TM based pipe-joining compound be used on all threaded fittings.

If AFFF foam concentrate spills on any painted surface, immediately wash the area with water. The solvents in the AFFF may cause streaking of a painted surface.

It is recommended that any area where a bladder tank is installed be heated to a minimum of 35ºF. Freeze protected AFFFs are manufactured for storage in temperatures as low as -20ºF; however, after a bladder tank system has been flow tested and drained, a small amount of water could still be left inside the tank around the bladder. If subjected to temperatures below 32ºF, it could freeze and damage the bladder.

Before any testing of the foam system is initiated, isolate the bladder tank from the system by closing the manual ball valves and flush the rest of the system with water to remove any rocks or other foreign material that may be in the pipe work.

All valves, swing check, etc., shown on any sketches in this information are recommended to be installed within the piping arrangements to/from the bladder tank.
VERTICAL BLADDER TANK WITH THREE PROPORTIONING CONTROLLERS

The above tank is under constant pressure from the water supply.
VERTICAL BLADDER TANK WITH ONE PROPORTIONING CONTROLLER
BLADDER TANK SYSTEM WITH MAIN AND RESERVE TANKS

To Discharge Devices

Proportioning Controller

Deluge Valve

OS & Y Valve

Water Supply

Foam Concentrate

Manual 1/4 Turn Ball Valve

Normally Open

Manaul 1/4 Turn Ball Valve

Normally Closed

Hydraulic Actuated Ball Valve

Normally Closed

Swing Check Valve

Tank Shell Drain / Fill Valve

Bladder Drain / Fill Valve

Bladder Vent Valve

Bladder Vent Valve

Main

Reserve

Bladder Tank

Tank Shell Vent Valve

Tank Shell Vent Valve

Tank Shell Vent Valve

Tank Shell Vent Valve

Tank Shell Drain / Fill Valve

Bladder Tank
VERTICAL BLADDER TANK WITH THREE PROPORTIONING CONTROLLERS

The above tank is under constant pressure from the water supply.