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1. ASME Code Pressure Vessel
2. Flexible, nylon reinforced elastomeric concentrate bladder
3. Concentrate controller(s) (as required priced separately)
4. Sight gauge
5. Vent Valves
6. Water inlet
7. Fill cup (included with AFFF only)
8. Water drain/fill valve
9. Concentrate filling/drain valve
10. Vessel support mounts (stand)
11. Channel inlet/drain
12. Total discharge pipe
13. Thermal relief valve (see instructions)
Primary and Thermal Relief Valves

The design pressure and maximum working pressure for the Viking bladder tank is 175 PSI (12 BAR). It is the responsibility of the owner or design engineer to provide a primary relief valve to protect the tank from a rapid over-pressurization. Details of the fire protection systems design must be known, such as water pressure and flow capacity, to size this relief valve.

Thermal expansion of the foam concentrate within the tank can also create pressures exceeding the rated capacity of the bladder tank. This slow but steady pressure increase could result in problems ranging from leaks at threaded or flanged connections to physical damage of the bladder or pressure tank.

To prevent or lessen the effect of thermal expansion, we recommend the following:

1. Avoid filling the tank with cold concentrate. Allow concentrate to warm to room temperature, if possible.

2. Do not fill beyond the tank’s rated capacity. All Viking bladder tanks have approximately 3-5% extra capacity for expansion.

3. Install a sun canopy over tanks installed outdoors.

4. Install a thermal relief valve on the foam vent outlet tee. (For non continuous pressurized tank only).

Viking recommends that only tanks installed "normally un-pressurized" have these relief valves. This type of installation, while completely acceptable, is most likely to experience the effects of thermal expansion should the tank be filled to capacity with foam concentrate.

The safety relief valves on bladder tanks installed "normally pressurized", such as in wet pipe systems or preaction systems should have relief valve installed on water vent outlet. These installations frequently have fire pumps that cycle on and off, creating pressure spikes which can result in frequent discharge of water through the relief valve. It is the responsibility of the owner or design engineer to determine:

1. If these pressure spikes can occur; and

2. If a device or method is required to protect the tank and/or water piping and valves from over-pressurization.

3. Also, the relief valve should be piped to a drain.

The relief valve for pressurized systems is only adequate for relief of pressure which could build up over periods of time due to fire pump cycling and/or checked line pressure.

Viking can provide a relief valve that is compatible for this service. Refer to our schematic diagram for its recommended locations. Please specify when ordering whether the tank will be installed pressurized or not. Diagram V830d shows relief valve "H" installed in water vent or foam vent outlet.
Concentrate Piping CCS

In order to prevent the migration of the concentrate stored in the CCS bladder into the water system, it is recommended that the concentrate controller be located level with the top discharge of the CCS tank. In addition, a concentrate isolation valve should be installed in the concentrate pipe between the CCS tank and the concentrate controller for either manual or automatic systems.

This method of installation prevents the heavier-than-water (AFFF/ATC) concentrate from draining or siphoning from the tank into the water supply piping. The concentrate isolation valve serves as a positive means of separating the concentrate from the water supply source.

When the concentrate is not isolated from the water supply, there have been cases where the concentrate has siphoned out of the bladder and was replaced by supply water, giving the erroneous indication that the bladder has ruptured.

This is very probable when the controller is positioned lower than the top flange of the CCS.

Piping between the CCS and the controller is not furnished, and is the responsibility of the system design engineer for the type system wanted - manual, automatic electrical, automatic pneumatic, automatic hydraulic, fail-safe, dry, wet, etc.

For more complete description of CCS piping design recommendations, see Viking "Foam Concentrate Control System (CCS) Design and Calculation Data Sheet 100" and various design system configurations in Foam Data Book.
IMPORTANT FOR OPERATION:
Piping between the concentrate vessel and concentrate controller is not furnished by Concentrate Control system manufacturer. The concentrate piping to the controller must meet certain criteria to prevent loss of concentrate into the water supply piping. This piping (dotted lines on the schematic below) is to be included by the design engineer for the type system wanted - manual, electric, pneumatic, hydraulic, fail-safe, etc. Viking does not accept responsibility for concentrate piping to the controller or water piping to the concentrate vessel.

NOTE: (Per schematic below) Manual System - Valve No.s 1 and 2 must be fully open manually. Automatic System - Valve No. 8 must be opened with an alarm signal (if necessary, use manual override). See Viking Design Section for various methods.

TYPICAL SCHEMATIC DIAGRAMS:
Consult the system design for actual piping requirements. Before filling system, consult manufacturers filling procedure. Improper filling can result in damage to the concentrate bladder.

COMPONENT DESCRIPTION
A - Storage Tank
B - Bladder
C - Concentrate Controller
D - Automatic Valve (optional)
E - Sight Gauge
F - Water Supply Piping (See instructions above)
G - Solution Delivery Piping (See instructions above)
H - Thermal Relief Valve (optional)
I - Swing Check Valve

*Installed in foam concentrate vent or water vent outlets, non pressurized or pressurized, respectively.

<table>
<thead>
<tr>
<th>VALVE NUMBER</th>
<th>DESCRIPTION</th>
<th>*NORMAL VALVE POSITION</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Automatic System</td>
</tr>
<tr>
<td>1</td>
<td>Manual concentrate shut-off - by others</td>
<td>N.O.</td>
</tr>
<tr>
<td>2</td>
<td>Water pressure shut-off - by others</td>
<td>N.O.</td>
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<tr>
<td>3</td>
<td>Sight Gauge shut-off</td>
<td>N.C.</td>
</tr>
<tr>
<td>4</td>
<td>Tank water vent</td>
<td>N.C.</td>
</tr>
<tr>
<td>5</td>
<td>Diaphragm concentrate vent</td>
<td>N.C.</td>
</tr>
<tr>
<td>6</td>
<td>Water drain/fill</td>
<td>N.C.</td>
</tr>
<tr>
<td>7</td>
<td>Concentrate drain/fill</td>
<td>N.C.</td>
</tr>
<tr>
<td>8</td>
<td>Automatic Concentrate Valve</td>
<td>N.C.</td>
</tr>
<tr>
<td></td>
<td>Model E-2 Halar Coated</td>
<td>N.C.</td>
</tr>
<tr>
<td>9</td>
<td>Fill line master shut-off</td>
<td>N.C.</td>
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</table>
INITIAL CONCENTRATE FILLING INSTRUCTIONS

CAUTION: USE ONLY AFFF OR ATC CONCENTRATE APPROVED FOR THIS SYSTEM. AVOID CONTACT WITH EYES. IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH WATER. SYSTEM NOMINAL CHARGE IS NOT NECESSARILY MAXIMUM CHARGE.

UNCATING PROCEDURE:

1. Remove all banding.
2. Remove all support blocks.
3. Raise unit to upright position using adequate nylon webbing slings or equal, as required.

PLACEMENT PROCEDURE:

1. Place unit in desired location(s).
2. Level and shim, as necessary.
3. Anchor unit with suitable bolts or other anchoring devices.
   (See installation drawing for bolt pattern and size)

NOTE: ALL BOLT PATTERN DIMENSIONS ARE NOMINAL. FIELD VERIFY BEFORE PROCEEDING WITH ANCHOR BOLT LAYOUT.

CONNECTION PROCEDURE:

1. Remove piping protectors.
2. Confirm that all bolts and threaded connectors remain tight after shipment of tank.
   Flanged nozzles on tank should not be tightened beyond 80 foot lbs., (11 kg-m).
3. Install controller(s) in sprinkler riser/water supply according to drawings provided by design engineer. Refer to Viking Foam Data Book, Design Section, for information regarding location and installation of controller.
4. Assemble interconnecting pipe and valves between tank and sprinkler riser/water supply. The concentrate control valve should be installed and trimmed for proper activation from the system control valve. See Viking Foam Data Book, Design Section, for desired method which meets application.
5. Attach the lower end of the sight gauge assembly to the lower fill pipe using the supplied 1" union. Attach this assembly to the tank at the tank support bracket using the supplied support rings.

CAUTION: DO NOT WELD ON TANK. HIGH TEMPERATURES CAN DAMAGE INTERNAL BLADDER
NOTE: THE CCS UNIT HAS BEEN PRESSURE TESTED BEFORE SHIPMENT FOR QUALITY ASSURANCE. DO NOT FILL TANK WITH WATER IN PREPARATION FOR HYDROTESTING WATER SUPPLY OR SPRINKLER SYSTEM PIPING. DO NOT PRESSURIZE TANK. ISOLATION VALVE NO.'S 1 AND 2 MUST REMAIN CLOSED DURING PIPING HYDROTEST.

WARNING

DO NOT WELD ON VESSEL
THIS VESSEL CONTAINS A RUBBER DIAPHRAGM WHICH WILL BE DAMAGED BY WELDING TEMPERATURES.

IMPROPER FILLING OF THIS VESSEL WILL DESTROY THE RUBBER DIAPHRAGM IT CONTAINS

CAREFULLY READ AND FOLLOW THE FILLING INSTRUCTIONS FURNISHED BY THE "CCS SYSTEM" MANUFACTURER TO AVOID DAMAGE

THE VIKING CORPORATION
HASTINGS, MICHIGAN USA 49058
ADDITIONAL ITEMS:

1. (1) Garden Hose
2. (1) 5 Gallon (20 liters.) Bucket
3. (1) 55 Gallon (200 liters.) Barrel
4. (1) 10 Ft. (4 meters) clear flexible hose with hose connections

NOTES:

1. Use Teflon® tape on threads
2. 1" diameter hose and connections may be substituted for AFFF concentrates
3. Clear reinforced hose recommended
Before starting the fill procedure, attach the following:

a. 3/4” clear, flexible hose to valve no. 4 and terminate in a 55 gallon (200 liter) barrel
b. Water source to valve no. 6 (garden hose).

Refer to the appropriate concentrate schematic for valve description.

Step 1: Close all valves except No.’s 4, 5, 6, and 7, and fill line master shut-off Valve No. 9, WHICH MUST BE OPEN.

Step 2: Fill the shell with water through Valve No. 6 (do not exceed 25 PSIG water pressure) until a steady full flow occurs from Valve No. 4. DO NOT CLOSE VALVE NO. 4 WITH LINE WATER PRESSURE ON VALVE NO. 6. CLOSE VALVE NO. 6, THEN CLOSE VALVE NO. 4.

Step 3: Check for water at Valve No. 7. If water has appeared, and if water flow continues, consult the CCS supplier before proceeding. If no water appears, proceed to next step.

Step 4: Close Valve No. 7.
Step 5: Connect air source to Valve No. 5 (see Figure No. 1 and Figure No. 4) and fill bladder with air (10 PSI maximum) through Valve No. 5 while displacing water through Valve No. 4. Continue until 25% of the water volume (10% for a horizontal unit) has been displaced.

Water volume is to be measured with the 55 gallon (200 liter) drum.

Step 6: When the required water volume has been displaced, close 1/4" shut-off valve on the regulator to trap air inside the bladder, disconnect the air supply, and close Valve No. 4.* Remove the air regulator.

A 10 PSI (0.7 BAR) air bubble has now been formed within the bladder. This lifts the excess bladder material off the bottom of the vessel, allowing for uniform expansion of the bladder as the concentrate is pumped in.

Step 7: Prime and connect the concentrate pumping apparatus (see Figure No. 2 and 4) and to Valve No. 7, as shown above. Use a Centrifugal Pump or Pneumatic Operated Diaphragm Pump.

Step 8: Remove the water hose from the 55 gallon (200 liter) drum, and terminate to drain.

Step 9: Start the concentrate pump, open Valve No. 4, then Valve No. 7, pumping concentrate into bladder.

*If Valve No. 4 is left open at this point, water will continue to flow out, reducing the pressure in the bladder.
The concentrate displaces the shell water. If tank pressure steadily decreases, it will be necessary to partially close Valve No. 4 to slow down the discharge of water. If tank pressure steadily increases, it will be necessary to partially (or fully) open Valve No. 4 to allow the pressure to drop back to 10 PSI (0.7 BAR). Slowing the pump discharge will also lower the tank pressure.

When approximately 75% of the nominal charge has been attained, (90% for horizontal tanks), shell water will stop flowing and the tank pressure will begin to exceed 10 PSI (0.7 BAR).

Step 10: Partially open 1/4" shut off at Valve No. 5 to vent and slowly allow air pressure to drop to 0 PSI while continuing to pump the concentrate to the rated capacity.

**IMPORTANT:** IF CONCENTRATE OVERFLOWS FROM VALVE NO. 5, DRAIN BACK SEVERAL GALLONS TO ALLOW FOR EXPANSION OF AGENT. FILL ONLY TO RATED CAPACITY! OVERFILLING MAY DAMAGE THE BLADDER!

Step 11: Close Valve No. 7, shut off the pump, and remove 1/4" valve and gauge assemble from Valve No. 5.

**SIGHT GAUGE PROCEDURE**

Step 12: Open Valves No. 3 and No. 9, and allow sight gauge to fill. Mark level for future reference. Close sight gauge valves No. 3 and No. 9 and drain concentrate from tube by opening valves No. 7 and No. 3. (Note: Make sure all pressure is vented off from valves 4 & 5 before opening sight gauge valve No. 3). After concentrate is completely drained, close valve No.'s 3 and 7.
SHELL WATER REFILL PROCEDURE

The installed bladder tank will be either normally pressurized or non-pressurized, depending upon the type of system (wet or deluge), and the piping design. If pressurized, refer to Steps 13-18; if non pressurized, refer to Steps 13 and 19-21.

NOTE: IN MOST INSTALLATIONS, THE PIPING DESIGN REQUIRES THE TANK TO BE NORMALLY PRESSURIZED. IF SO, FOLLOW STEPS 13-18. SHOULD THERE BE QUESTIONS CONCERNING WHEN OR HOW TO PRESSURIZE THE TANK, CONTACT THE DESIGN ENGINEER OR VIKING.

Step 13: Attach a water supply hose to Valve No. 6 and the clear flexible hose to Valve No. 5. Terminate the clear hose into a 5 gallon bucket (see Figure No. 6)
NORMALLY PRESSURIZED

Step 14: Close all valves except for No. 4 and No. 5.

Step 15: Open Valve No. 6 (allowing water into the shell) until water overflows from Valve No. 4 and concentrate overflows from Valve No. 5. Close Valve No.'s 4, 5, and 6.

Step 16: Carefully and partially open Valve No. 2 to allow water from the main supply to enter tank and equalize to line pressure. When pressurized, open valve to full.

**VERIFY AUTOMATIC VALVE NO. 8 IS CLOSED!**

Step 17: Open Valve No. 1. Place all valves in normal position. Install all lock pins in proper locations (refer to "Valve Descriptions" on page V830d)

Step 18: Inspect for piping leaks and correct, as necessary.

NORMALLY UN-PRESSURIZED

Step 19: Close all valves except for Valve No.'s 4 and 5.

Step 20: Open Valve No. 6 (allowing water into shell) until water overflows from Valve No. 4. Close Valve No. 6, then Valve No.'s 4 and 5.

**VERIFY AUTOMATIC VALVE NO. 8 IS CLOSED (IF VALVE NO. 8 IS USED)!**

Step 21: Open Valve No.'s 1 and 2.*

*There should be no water pressure on the tank. Lock all valves in proper locations (refer to "Valve Descriptions" on page V850f).
CONCENTRATE LEVEL CHECK

AFFF LEVEL CHECK (Refer to Schematic on Page V830d)

Step 1: Close Valve No.’s 1 and 2 to isolate tank.

Step 2: Attach a hose to Valve No. 6 and terminate to drain. Be aware that the tank may be under pressure.

Step 3: Open Valve No. 6 carefully to relieve pressure. Once pressure is relieved, fully open Valve No. 6, draining water from the shell, then slowly vent Valve No.’s 4 and 5.

Step 4: After the water has completely stopped draining, open Valve No.’s 3 and No. 9. Observe sight gauge level (Figure 7).
   a. If the level is normal, follow the “Shell Water Refill Procedure” on page V830l.
   b. If the level is below normal, add concentrate (per the ”Refill Procedure” on page V830l), to the desired level. Again, follow the “Shell Water Refill Procedure” on page V830l.
   c. Close Valve No.’s 3 and 9. Drain concentrate from the level gauge by closing Valve No. 9 and open slowly Valves No. 7 and No. 3.

Step 5: After concentrate is completely drained, close valve No.’s 3 and 7.

ATC CONCENTRATE LEVEL CHECK (Refer to Schematic on Page V851f)

Steps 1-3: The same as above.

Step 4: When water has completely stopped draining, open Valve No.’s 9 and 3. Observe the sight gauge level (because of the thick viscosity of ATC, allow time for level to rise).

Step 5: Repeat (a) and (b), as above.
   d. Drain concentrate from the level gauge by closing Valve No. 9, then slowly open Valve No.’s 7 and 3 (Figure 7).

Step 6: After concentrate is completely drained, close Valve No.’s 3 and 7.

NOTE: BECAUSE OF THE THICK VISCOSITY OF ATC FOAM, THE SIGHT GLASS MAY NOT ACCURATELY MEASURE THE LEVEL. TO DETERMINE THE AMOUNT OF CONCENTRATE INSIDE THE UNIT, CONTINUE TO FOLLOW THE PROCEDURE ON “CONCENTRATE LEVEL CHECK,” BUT MEASURE THE AMOUNT OF WATER DRAINED FROM THE SHELL.

EXAMPLE: THE DESIGNED CAPACITY OF A 6000 HORIZONTAL UNIT IS 6000 LITERS, THE ACTUAL CAPACITY IS 6300 LITERS. IF 600 LITERS OF WATER IS DRAINED FROM THE SHELL, 5700 LITERS OF CONCENTRATE REMAIN. CONSULT VIKING FOR ACTUAL CAPACITIES OF TANKS.
REFILL PROCEDURE - 50% OR MORE DISCHARGED

This method is to be used when the tank has been isolated from the system water drained from the shell and 50% or more of the nominal tank volume has been discharged and determined. See page 830m for instructions on concentrate level check.

Refer to page 830g for the schematic on pumping apparatus.

Step 1: Close Valves No. 1, 2, 3, 6 and 7.

Step 2: Fill the tank with water through Valve No. 6 until water flows from Valve No. 4 and/or concentrate from Valve No. 5. Close Valve No.’s 5 and 6.


REFILL PROCEDURE - LESS THAN 50% DISCHARGE

This method is to be used when less than 50% of the nominal tank volume has been discharged and determined. See page 830m for instructions on concentrate level check.

Step 1: Close Valve No.’s 1 and 2, (isolating the tank from the system), and 3.

Step 2: Open Valve No.’s 4, 5, and 6 and fill line master (No. 9).

Refer to page V851c for the schematic on pumping apparatus.

Step 3: Attach a 3/4” clear flexible hose to Valve No. 5 and terminate into a 5 gallon bucket.

Step 4: Prime and connect the pumping apparatus to Valve No. 7. Start the pump, open Valve No. 7, and pump concentrate to the rated capacity.*

Step 5: Refer to "Sight Gauge Procedure" (page 830m) and "Shell Water Refill Procedure" on page 830k-l.

AFFFF FILL CUP PROCEDURE

This method can be used to add small volumes of AFFF concentrate. It is not recommended for initial filling of the tank or for ATC foams.

Step 1: Close all valves. Slowly open Valve No. 4 to relieve pressure. Open Valve No. 6 to drain.

Step 2: Open Valve No.’s 3, 5 and 9. Observe liquid level in sight gauge.

Step 3: Attach fill cup to valve No. 5. Add concentrate via fill cup to required level.*

Step 4: Close all valves and proceed to “Shell Water Refill Procedure.” Drain sight gauge and remove fill cup.

*IMPORTANT! IF CONCENTRATE OVERFLOWS FROM VALVE NO. 5, DRAIN BACK SEVERAL GALLONS TO ALLOW FOR EXPANSION OF AGENT.

FILL ONLY TO RATED CAPACITY!
MAINTENANCE PROCEDURES

The bladder proportioning system you have purchased has three (3) main components: a carbon steel pressure tank, Buna-L nylon bladder, and a concentrate controller. This simple design requires no outside source of energy, other than water, to proportion foam concentrate, accurately over a wide flow range.

Despite this basic design, routine inspections, tests, and maintenance should be performed to verify the unit is full and in operating condition. This routine should extend to all the components which make up the fire extinguishing system to verify that all are in working order.

Testing and maintenance of these components is covered in Chapters 6 and 7 of NFPA 16, reprinted below.

CHAPTER 6, PERIODIC TESTING

6-1 TESTING AND INSPECTION OF FOAM CONCENTRATE INJECTION SYSTEMS

Foam concentrate injection systems shall be so arranged that periodic tests and inspections are made at least annually without discharging foam solution to the system piping in order to check operation of all mechanical and electrical components of the system. The system shall be so arranged that tests can be performed with as little loss of foam as practical.

6-2 INSPECTION OF FORMAL CONCENTRATE

Periodic inspection shall be made at least annually of foam concentrates and their containers for evidence of excessive sludging or deterioration. Inspection shall include a qualitative test of the foam concentrate normally conducted by the manufacturer. Presence of specific quantities of concentrates in system-storage equipment in service-ready position and quantities of reserve concentrates on hand shall be checked with requirements for same.

6-3 TRIPPING OF WATER-CONTROL VALVES

Water-supply control valves and their automatic and manual tripping means shall be trip tested semi-annually. Test shall be such that they may be accomplished without discharging foam from system discharge devices or diminishing or diluting the foam concentrate supply.

6-4 TESTING AND INSPECTIONS OF ALARM AND DETECTION DEVICES

Alarm and detection devices shall be tested and inspected in accordance with NFPA 72, "Standard for Installation, Maintenance, and Use of Protection Signaling Systems", and NFPA 72E, "Standard on Automatic Fire Detectors."
CHAPTER 7, MAINTENANCE

7-1.1 DELUGE FOAM-WATER SPRINKLER AND FOAM-WATER SPRAY SYSTEMS

Systems shall be serviced by personnel experienced in this work at periodic intervals, preferable semi-annually, but at least annually.

7-1.2 Proportioning devices and strainers shall be thoroughly inspected and cleaned after each operation or flow test.

7-2 OPERATING AND MAINTENANCE INSTRUCTIONS AND LAYOUTS

Operating and maintenance instructions and layouts shall be readily available at the control equipment and at the plant fire headquarters. Selected plant personnel shall be trained and assigned the task of operating and maintaining the equipment.

RECOMMENDATIONS FOR MAINTENANCE AND INSPECTIONS

1. The designated inspector should be a responsible and experienced personnel with a basic knowledge of fire equipment and the specific fire protection system.

2. Initial test data information is important for reference points.

3. Proper personnel should be notified of shut down for service. This includes, but is not limited to, area workers, alarm company, underwriters, etc.

4. Before working on a CCS tank or any sprinkler riser components, close the manual concentrate valve (No. 1) and the water pressure valve (No. 2). Be aware that the CCS tank may still be under pressure.

5. Check the general appearance, including name plates and decals, for readability.

6. Inspect for corrosion, leaks, or mechanical damage. Repair and/or repaint where necessary.

7. Verify the concentrate level. Follow the procedure for "Concentrate Level Check" on page 830m. If the concentrate is lower than recommended, refer to the Refilling Instructions on page 830n.

   NOTE: DRAIN THE SIGHT GAUGE FOLLOWING A LEVEL CHECK

8. For other system components refer to the inspection and maintenance data sheets furnished with the equipment.

While water is draining from the tank, observe for presence of foam concentrate. A small amount of foam is not uncommon. Large amounts of foam or pure concentrate can be a sign that further inspection or maintenance is required. Contact Viking for further instructions.
9. Collect a sample of foam concentrate according to the guidelines on page 830s.

10. Examine all auxiliary equipment in accordance with the manufacturer’s instructions; check the electric or hydraulic isolation valves for operation.

**NOTE:** BECAUSE OF LACK OF USE, VALVES MAY STICK. LUBRICATE WHERE NECESSARY. WHEN VALVES AT CONCENTRATE POINTS LEAK OR DO NOT FULLY CLOSE, CONCENTRATE MAY ESCAPE, AND (ESPECIALLY IF A CHECK VALVE IS NOT INSTALLED) LET WATER ENTER THE FOAM TANK. REFER TO THE SECTION ON FOAM MIGRATION.

11. Refer to "Shell Water Refill Procedure."

12. Verify all valves are in the proper position (refer to the schematic for "Normal Valve Position").

13. Notify the proper personnel that the system is back in service.

14. Record the date of inspection and any service provided.

**NOTE:** BECAUSE OF THE THICK VISCOSITY OF ATC FOAM, THE SIGHT GLASS MAY NOT ACCURATELY MEASURE THE LEVEL. TO DETERMINE THE AMOUNT OF CONCENTRATE INSIDE THE UNIT, CONTINUE TO FOLLOW THE PROCEDURE ON "CONCENTRATE LEVEL CHECK", BUT MEASURE THE AMOUNT OF WATER DRAINED FROM THE SHELL.

**EXAMPLE:** THE DESIGNED CAPACITY OF A 6000 HORIZONTAL UNIT IS 6000 LITERS, THE ACTUAL CAPACITY IS 6300 LITERS. IF 600 LITERS OF WATER IS DRAINED FROM THE SHELL, 5700 LITERS OF CONCENTRATE REMAIN. CONSULT VIKING FOR ACTUAL CAPACITIES.

**NOTE:** DISPOSE OF ALL FOAM SOLUTION DISCHARGED DURING TESTING OR MAINTENANCE IN ACCORDANCE WITH LOCAL CODES AND REGULATIONS. CONTACT VIKING OR THE CONCENTRATE MANUFACTURER, FOR PRODUCT DATA OR DISPOSAL RECOMMENDATIONS.
INSPECTIONS OF FOAM CONCENTRATES

As per NFPA 16, Section 6-2, inspection of foam concentrates:

Periodic inspection shall be made at least annually of foam concentrates and their containers for excessive sludging or deterioration. Inspection shall include a qualitative test of the foam concentrate normally conducted by the manufacturer.

Eight ounce (8 oz.) (250 ml) samples of foam concentrate should be taken from the top concentrate Valve No. 5 on the tank, and from the bottom concentrate drain/fill Valve No. 7. 3M foam samples may be sent to the following address:

Gor-Fol Manufacturing
51 Second Avenue West
Foley MN 56320

Either glass or plastic bottles are satisfactory, provided they are leak-proof and will be packaged. The sample(s) must be labeled and an accompanying letter should contain your purchase order number for the $50 charge per sample. Provide the location, type of concentrate, Lot Number, storage container, age, name, and phone number of the man sending the sample(s). The sample(s) will be evaluated for appearance, foam expansion, drain time, and film spread, as compared to 3M standards. A staff member of 3M Laboratory will review the test results and send you a summary of the findings.

NOTE: DISCARD CONCENTRATE (PER MANUFACTURER’S RECOMMENDATIONS) IF FOUND DILUTED. CORRECT THE SOURCE OF DILUTION BEFORE REPLACING THE NEW CONCENTRATE INTO TANK. CONSULT VIKING FOR PROCEDURES ON TESTING INTEGRITY OF BLADDER.
BLADDER REPLACEMENT PROCEDURES FOR CCS UNITS

1. MATERIAL
   a. Cotton clothes line
   b. Large jar of Vaseline or non petroleum based jelly
   c. Sharp pocket knife
   d. Appropriate size replacement bladder
   e. Flashlight
   f. Drop cloth

2. VESSEL PLACEMENT
   2.01 Disconnect the vessel from the existing piping system.
   2.02 Remove sight gauge assembly.
   2.03 Place the vessel in a horizontal position with ALL flanged connections easily accessible (vertical vessel has 2 flanged connections, horizontal vessel has 4 flanged connections).

3. REMOVAL OF DAMAGED BLADDER
   3.01 Remove all flange bolting and flanges
   3.02 CAREFULLY remove plastic support pipes through the open nozzles (1 pipe in vertical vessels, 2 pipes in horizontal vessels.)
   3.03 Carefully fold over ALL bladder nozzles EXCEPT the nozzle where the bladder is to be removed, and push them inside the vessel.
   3.04 Clean an area on the floor or ground large enough to lay down the fully opened bladder without cutting or puncturing it. Place a drop cloth or polyethylene sheet over the clean area to place the bladder on.
   3.05 Reach inside the bladder nozzle (which is still in its original position) as far as possible and grasp the bladder which is inside the vessel and begin pulling it into the nozzle so that the bladder nozzle itself moves free of the vessel. DO NOT PULL ON THE BLADDER NOZZLE. At this point, take both hands and begin squeezing the bladder together and pulling it through the vessel nozzle. Continue this operation until the bladder has been removed from the vessel. USE CARE WHEN REMOVING BLADDER NOZZLES FROM THE VESSEL, remember, DO NOT PULL ON THE BLADDER NOZZLES.
4. INSERTION OF THE NEW BLADDER

4.01 Clean an area on the floor or ground large enough to lay down the fully opened bladder without cutting or puncturing it. Place a drop cloth or polyethylene sheet over the clean area to place the bladder on.

4.02 Using a pole or long rod, feed sufficient lengths of clothes line to reach from each vessel nozzle (1 nozzle on vertical vessels, 3 nozzles on horizontal vessels) to the vessel nozzle which the bladder will be inserted through, with enough extra line to tie it to the vessel nozzle flange and the appropriate bladder connection.

4.03 Lay out the new bladder so that A.I.R. stamp on both end flanges are on the top and parallel with each other. CAUTION: When inserting the bladder, the A.I.R. stamp must be kept in the same orientation to ensure against twisting of the bladder in the vessel (which would cause a failure of the bladder when filling it).

4.04 Using the line from the vessel nozzle opposite the insertion nozzle, squeeze the bladder together near the bladder nozzle, and wrap the line 3 times and tie it 12" from the bladder nozzle. DO NOT TIE THE LINE ON THE BLADDER NOZZLE. Take the other lines (if working on a horizontal vessel) and tie them to the appropriate nozzles. Again, align A.I.R. stamp located on bladder nozzles for proper orientation.

4.05 Liberally smear Vaseline around the inside of ALL vessel nozzles.

4.06 Station one person by the bladder and another person at the opposite end of the vessel. The person on the bladder end shall carefully fold the first nozzle to a size which will pass through the vessel. For horizontals, insert side nozzle through tank flange, one at a time. Continue this operation until the bladder is in the vessel and the last nozzle is in place. CAUTION: Make sure the A.I.R. stamps are parallel on the bladder and kept in the same orientation during the entire bladder insertion. During this time, the person at the opposite end shall look inside of the vessel using a flashlight to ensure that the bladder is not getting twisted or bunched up, all the while taking up the slack in the line. DO NOT PULL THE LINE, as it may cause damage to the bladder. Remove the lines as necessary. When the final bladder nozzle is moved into place, the A.I.R. stamp orientation should be identical at both ends (if they are not the same, take corrective action).

4.07 Insert the vertical PVC pipe of horizontal tanks from top, position center hole toward ends. It may be necessary for one man at opposite end to raise up on bladder if it hangs up. Then insert horizontal pipe from end of vessel, note position of center hole to position vertical at center location. End flange has pin which locates hole position. Be sure to install end flange to position center holes vertical.

4.08 Position all vessel flanges and securely bolt them in place. Alternately tighten these bolts to a maximum of 80 foot pounds (11 Kg-m). Properly tightened, the bladder nozzle should not protrude more than 3/8" beyond the outside diameter of the tank flange.