VIKING®

DESIGN DATA

PREACTION FOAM/WATER SYSTEM USING AFFF OR ATC

A PREACTION BLADDER TANK FOAM/WATER SYSTEM WITH HYDRAULICALLY ACTUATED DELUGE CONCENTRATE CONTROL VALVE

1. DESCRIPTION

A Preaction Bladder Tank Foam/Water System is a standard preaction system capable of discharging a foam/water solution automatically through any sprinklers that operate. A Preaction Bladder Tank Foam/Water System with a hydraulically actuated Halar® coated Viking Deluge Concentrate Control Valve (CCV) consists of a standard preaction system using a Viking Deluge Valve complete with full standard preaction trim, detection and releasing devices on the water supply line, a concentrate controller-proportioning device with appropriately sized orifice, a hydraulically actuated Viking Halar® coated deluge CCV on foam concentrate line, a foam concentrate bladder tank and trim and foam agent.

2. OPERATION

Actuation of the non-interlock, single or double interlock preaction system release line (pneumatic, hydraulic or electric) relieves the pressure in the priming chamber of both the Viking deluge valve (C) and the Viking Halar® coated deluge CCV (D). This allows the clapper to open on both valves (C) and (D). The system piping is filled with water, activating connected alarms. The bladder tank (A) is already pressurized by the water supply piping (11). System water pressure in the space between the flexible bladder and the inside surface of the steel tank, causes the bladder to collapse, forcing the foam concentrate out through the foam concentrate discharge piping (14), Viking Halar® coated deluge CCV (D), and the metering orifice of the concentrate controller (B), into the venturi (low pressure) area of the concentrate controller (B). The foam concentrate is proportioned (usually 3% or 6%), with the main water supply, sending foam solution to the sprinklers and foam/water discharge devices downstream.

3. DISCHARGE DEVICES

- Standard spray sprinklers
- Hose reels and hand lines
- and other approved dispensing devices

4. GENERAL INSTRUCTIONS AND WARNINGS

A. Refer to the **General Notes** and **Warnings** on pages 750a& b and 751a & b.

B. Refer to specific technical data sheets, acceptable installation standards, codes and Authority Having Jurisdiction for additional installation, operation and maintenance instructions.

C. Inspections - It is imperative that the system be inspected and tested on a regular basis. See Inspection and Maintenance.

D. **WARNING** - Any system maintenance or testing which involves placing a control valve or detection system out of service may eliminate the Fire Protection of that system. Prior to proceeding, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a Fire Patrol in the affected area.

E. The valve, trim and assembly must be installed in an area not subject to freezing temperatures or physical damage.

5. DESIGN & INSTALLATION

WARNING: Locate all portions of the foam/water system subject to freezing, in a heated area.

A. Refer to the Special Notes on page 301c and the **General Notes** and **Warnings** on pages 750a& b and 751a & b.

B. Install the preaction valve (C) and trim in accordance with the Viking Engineering and Design Data Book.

C. Install the proportioning device, concentrate controller with integral orifice (B), in riser piping level with top of bladder tank (A). This will help prevent the foam concentrate from draining or siphoning from the tank into the water supply piping due to expansion of foam in bladder tank. (See Note A and B, Page 301c)

D. Install foam solution test valve (16**) and system isolation valve (17**), if required. These optional valves are used to conduct foam/water solution tests and are not usually required. However, they eliminate the need for running a foam/water solution test through the system piping.

E. Install hydraulically actuated Halar® coated Viking deluge CCV (D) and associated trim including a removable spool piece as indicated on Figure 301, Page 301b, and trim charts or technical data pages.

F. Install bladder tank (A) in accordance with the manufacturer's instructions with connections as shown on Figure 301, Page 301b and herein described.

1. Locate the tank as close as practical to the system riser. (See Special Note B on Page 301c)
2. Allow enough room around the tank to service the bladder.
3. Allow access to the tank for filling from barrels of foam concentrate
4. Install the pipe from the riser to the tank as indicated on Figure 301. The tank water supply piping (11) from the riser which supplies the bladder tank (A) should be installed higher than or level with the top of the bladder tank (A) as shown in Figure 301. The tank water supply piping connection for a pre-action system should be installed below the pre-action valve as shown on Figure 301. This is to eliminate the possibility of allowing compressed air into the bladder tank which could damage the bladder. This will also prevent the accidental draining of the bladder tank water supply piping and tank, when draining the system riser. Install the piping from the tank (A) to the concentrate controller (B) as straight as possible.
5. All valves and devices should be located for easy access for operation and maintenance.

G. Pressurize System

1. Verify that water supply valve (9) is closed, close tank water supply control valve (10), then place the preaction valve (C) in service as follows (See installation instructions on Viking Technical Data Sheet) Open system isolation valve (17**) if closed.
2. Set release and detection system according to installation instructions for type of preaction system used. Pressurize system piping with air pressure per installation instructions for the type of preaction system being used.
3. Prime both Viking Deluge valves (C & D) by opening the priming valve on the preaction deluge valve (C) trim. Bleed off any air pressure trapped in the priming line (12) to the Viking Halar® coated CCV (D) by opening the 3 way pressure gauge valve (13).

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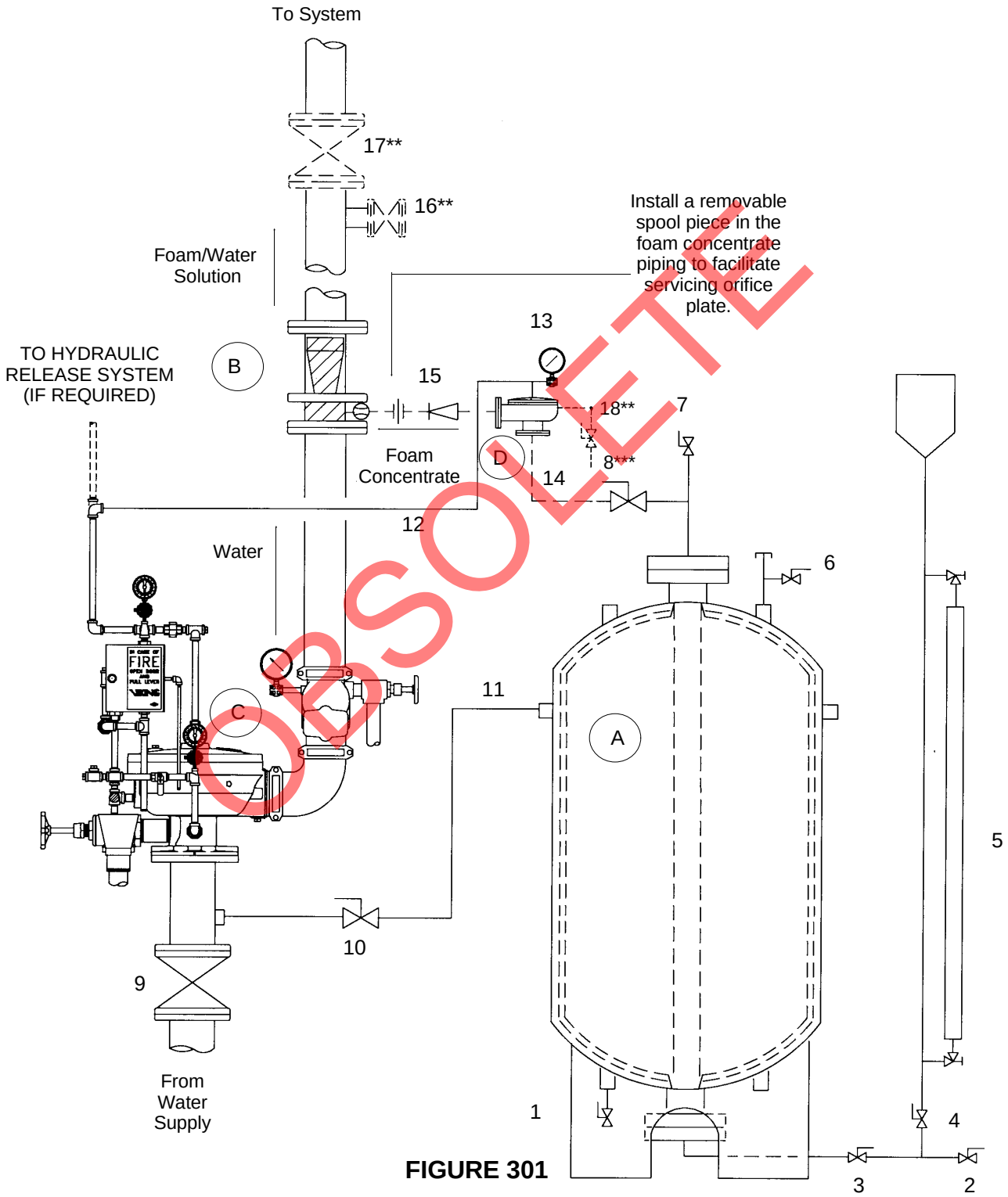

FIGURE 301

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SYSTEM COMPONENTS FOR FIGURE 301 - PREACTION BLADDER TANK FOAM SYSTEM WITH HYDRAULICALLY ACTUATED DELUGE CONCENTRATE CONTROL VALVE

A. Foam Concentrate Bladder Tank complete with Items 1-7
1. Water Drain/Fill Valve - NORMALLY CLOSED
2. Fill Line Master Shut-off Valve NORMALLY CLOSED.
3. Concentrate Drain/Fill Valve NORMALLY CLOSED
4. Fill Cup Sight Gauge Shut-off Valve - NORMALLY CLOSED
5. Sight Gauge Assembly - The trim for this assembly varies with the type of foam concentrate to be used. Refer to Tank Manufacturer's O & M Manual for specific details.
6. Tank Water Vent Valve - NORMALLY CLOSED
7. Diaphragm Concentrate Vent Valve - NORMALLY CLOSED

B. Proportioning Device - Concentrate Controller with Integral Orifice

C. Type of System - Preaction valve complete with Standard Trim, gauges, and preaction check valve all connected to an appropriate release and detection system
9. Water Supply Control Valve - NORMALLY OPEN

D. Foam Concentrate Control Valve (CCV) - Hydraulically actuated Viking Halar® coated deluge CCV
13. Water Pressure Gauge, 3 way valve and remainder of CCV special trim

E. Accessory Trim - (Order each item separately)
8. Concentrate Control Shut-off Valve - NORMALLY OPEN.***
10. Tank Water Supply Control Valve - NORMALLY OPEN
11. Water Supply Piping to Bladder Tank
12. Release Line/Priming Line Piping to foam concentrate control valve (D)
14. Foam Concentrate Discharge Piping
15. Foam Concentrate Swing Check Valve
16. Foam Solution Test Valve - NORMALLY CLOSED**
17. System Isolation Valve - NORMALLY OPEN**
18. 1/2" Foam concentrate auxiliary drain valve** (Only required on systems where concentrate controller (B) is installed below deluge valve (C)

** Recommended Optional Valves
*** Full Port Bronze Body with 316 Stainless Steel Trim and Ball (2" and under) for AFFF & ATC. Cast Iron Body OS & Y with Bronze Trim and Seats (over 2") for AFFF only.

SPECIAL NOTES

A Provide a minimum of 5 pipe diameters of straight pipe on the inlet and outlet of the concentrate controller (B) to minimize turbulence inside the concentrate controller. However, if the outlet to the foam solution test valve (16**) is located closer than 5 pipe diameters there may be turbulence at high flow rates.

B The combined total equivalent length of pipe (pipe length, plus equivalent lengths for fittings and valves) including both the water supply inlet piping (11) and the foam concentrate discharge piping (14), should 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 concentrate controller. If the total equivalent length must exceed 50 feet (15.2 meters), then refer to the Proportioning Device Design Data located in the Design Section of this data book for the method of calculating these pipe sizes.

C The Viking Halar® coated deluge CCV (D) and swing check valve (15) must be connected adjacent to the concentrate controller using pipe nipples as short as possible.

D Figure 301 is a general schematic of the required piping arrangement. Refer to the appropriate technical data page for specific information regarding the valve, tank, and related trim and devices.

E The technical information, statements and recommendations contained in this manual are based on information and tests which, to the best of our knowledge, we believe to be dependable. It represents general guidelines only, and the accuracy or completeness thereof, are not guaranteed since conditions of handling and usage are outside our control. The purchaser should determine the suitability of the product for its intended use and assumes all risks and liability whatsoever in connection therewith.

F The Viking Halar® coated deluge CCV (D) does not require any trim except for a 1/2" priming line (12) and water pressure gauge and 3 way valve (13) from the main deluge valve (C) to the priming chamber of valve (D). Plug all remaining valve trim outlets. Refer to the Equipment section of this data book under Valves, to find the correct trim kit part number for the corresponding size of foam CCV (D) required.

G A strainer is not required in the foam concentrate discharge piping (14) of bladder tank systems per NFPA Standards.

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Once air pressure has been relieved, close the 3 way valve and plug outlet. Re-open 3 way valve to maintain pressure on gauge (13)

4. When pressure in preaction deluge valve (C) and the CCV (D) priming chambers equal system water supply pressure, turn on system water supply by opening main drain on preaction deluge valve (C) and partially opening water supply valve (9). When water appears at main drain, slowly close main drain. Before fully opening water supply control valve (9), place alarm test shut-off valve in alarm position.
5. Place bladder tank (A) in service by following manufacturers instructions, except to slowly open concentrate control shut-off valve (8***) to allow foam concentrate to flow slowly to the Viking Halar® coated deluge CCV (D). With system fully set, fully open and secure water supply control valve (9)
6. Verify normal valve positions and secure in proper position (See system components table)
7. Check for and repair any leaks.

6. REMOVING THE SYSTEM FROM SERVICE AND RETURNING THE SYSTEM TO SERVICE

WARNING: See Warning on Page 301e, Item 7, Inspection and Maintenance

A. For system and riser piping maintenance and service.
1. Close water supply control valve (9) and shut-off supervisory air supply to system piping
2. Close concentrate shut-off valve (8***) and tank water supply valve (10)
3. Open all drain valves on preaction system
4. Leave system isolation valve (17**) open
5. Refer to instructions for removing the preaction deluge valve (C) from service in the Viking Engineering and Design Data Book
6. Perform maintenance and service on system and riser piping
7. With tank water supply valve (10) closed, place the preaction deluge valve (C) in service as follows (See installation instructions in Viking Engineering and Design Data Book)
8. Set release and detection system according to installation instructions for type of preaction system being used. Pressurize system piping with air pressure per installation instructions for the type of preaction system being used
9. Prime both Viking Deluge valves (C & D) by opening the priming valve on the deluge valve (C) trim. Bleed off any air pressure trapped in the priming line to the CCV (D) by opening the 3 way pressure gauge valve (13). Once air pressure has been relieved, close the 3 way valve and plug the outlet. Re-open 3 way valve to maintain pressure on gauge (13).
10. When pressure in deluge valve (C & D) priming chambers equal system water supply pressure, turn on system water supply by opening main drain on preaction deluge valve (C) and partially opening water supply valve (9). When water appears at main drain, slowly close main drain. Before fully opening water supply valve (9), place alarm test shut-off valve in alarm position. Verify system isolation valve (17**) is open.
11. Open tank water supply valve (10) and concentrate shut-off valve (8***). With system fully set, fully open and secure water supply control valve (9)
12. Verify normal valve positions and secure in proper position (See system components table)
13. Check for and repair any leaks.

B. For tank maintenance and service - While leaving preaction deluge system in service
1. Close concentrate shut-off valve (8***) and tank water supply (10)
2. Follow tank manufacturer's procedures for removing from service, and perform maintenance
3. To return to service, close water supply control valve (9) and verify Viking Halar® coated CCV (D) and preaction valve (C) are closed. Follow tank manufacturer's procedure for returning bladder tank to service, except to slowly open concentrate control shut-off valve (8***)
4. Verify that concentrate shut-off valve (8***), tank water supply (10) and system isolation valve (17*) are open. Verify preaction deluge valve (C) is primed, then open water supply control valve (9)
5. Verify normal valve positions and secure in proper position (See system components table)
6. Check for an repair any leaks

C. For total system maintenance and service
1. Close water supply control valve (9), concentrate control shut-off valve (8***) and tank water supply valve (10)
2. Shut off preaction system air supply and bleed off air pressure. Open all drain valves on preaction deluge system
3. Leave system isolation valve (17**) open
4. Refer to instructions for removing the preaction deluge valve (C) from service. See appropriate Viking Technical Data Sheet
5. Perform maintenance and service as required
6. Refer to the Special Notes on page 301c and the **General Notes** and **Warnings** on pages 750a & b and 751a & b.
7. Place the preaction valve (C) in service as follows (See installation instructions on Viking Technical Data Sheet) Open system isolation valve (17**) if closed.
8. Set release and detection system according to installation instructions for type of preaction system used. Pressurize system piping with air pressure per installation instructions for the type of preaction system being used.
9. Prime both Viking Deluge valves (C & D) by opening the priming valve on the preaction deluge valve (C) trim. Bleed off any air pressure trapped in the priming line (12) to the Viking Halar® coated CCV by opening the 3 way pressure gauge valve (13). Once air pressure has been relieved, close the 3 way valve and plug outlet. Re-open 3 way valve

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to maintain pressure on gauge (13)

10. When pressure in preaction deluge valve (C) and CCV (D) priming chambers equal system water supply pressure, turn on system water supply by opening main drain on preaction deluge valve (C) and partially opening water supply valve (9). When water appears at main drain, slowly close main drain. Before fully opening water supply control valve (9), place alarm test shut-off valve in alarm position.
11. Place bladder tank (A) in service by following manufacturers instructions, except to slowly open concentrate control shut-off valve (8***). With system fully set, fully open and secure water supply control valve (9)
12. Verify normal valve positions and secure in proper position (See system components table)
13. Check for and repair any leaks

7. INSPECTION AND MAINTENANCE

NOTICE: The owner is responsible for maintaining the fire protection system and devices in proper operating condition. For minimum maintenance and inspection requirements, refer to recognized standards such as those produced by NFPA, LPC and VdS which describe care and maintenance of sprinkler systems. In addition, the "Authority Having Jurisdiction" may have additional maintenance, testing and inspection requirements which must be followed.

WARNING - Any system maintenance or testing which involves placing a control valve or detection system out of service may eliminate the Fire Protection of that system. Prior to proceeding, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a Fire Patrol in the affected area.

Inspections - It is imperative that the system be inspected and tested on a regular basis. The following recommendations are minimum requirements. The frequency of the inspections may vary due to contaminated or corrosive water supplies and corrosive atmospheres. In addition, the alarm devices or other connected equipment may require more frequent inspections. Refer to the technical data, system description, applicable codes and Authority Having Jurisdiction for minimum requirements. Prior to testing the equipment, notify appropriate personnel.

A. **Alarm Test** - At least quarterly, test all connected alarm devices by opening the remote inspectors test valve.
B. **Riser Flow Test** - At least quarterly, perform a riser flow test. Observe and record the supply pressure gauge reading. Open the main drain valve fully. Again, observe and record the supply pressure gauge reading. Close the main drain valve. If the readings vary significantly from those previously established or from normal, check the main supply line for obstructions or closed valves and correct.
C. **General** - Visually inspect the valve, trim, piping, alarm devices and connected equipment for physical damage, freezing, corrosion or other conditions that may inhibit the proper operation of the system.

8. TROUBLESHOOTING

A. For operating and maintenance instructions pertaining to Viking manufactured equipment, refer to the appropriate Viking Technical Data Sheet.
B. For operating and maintenance instructions pertaining to foam equipment manufactured for Viking, refer to the appropriate section of the Viking Foam Data Book.
C. For operation and maintenance instructions for all other equipment, refer to appropriate equipment data

9. EMERGENCY INSTRUCTIONS

A. During and after a fire:
   1. Make sure the fire is OUT! Make a complete inspection of all areas covered by this system including areas not involved in the fire. Place a fire watch in the entire area until the system is back in service.
   2. Close the tank water supply valve (10) then close the system water supply control valve (9). Post a person at the valve ready to turn it back on, should the fire rekindle.
   3. Open the flow test angle valve, system drain valve and all auxiliary drain valves. Close drain valves once the system has completely drained.
   4. Replace any fused sprinklers in the pilot line (if so equipped), and any fused sprinklers in the preaction system, with the same type and temperature rating as were removed. Check all releases and/or detectors in the fire area for damage.
   5. Isolate the bladder tank (A) by closing the concentrate control shut-off valve (8***) and verify that the tank water supply control valve (10) is closed.
   6. Check the level of foam concentrate and refill the foam concentrate bladder tank (A) by following tank manufacturer's instructions. Always replace the foam concentrate with the same brand and type as that being used currently. **Note:** Never intermix different types or brands of foam concentrate, as this could cause them to gel or solidify, and render the concentrate useless.
   7. Return the complete system to service by following the procedure listed in Section 6C, Steps 6 through 13.
   8. Perform quarterly test.
   9. Fire can damage piping and supports, so call your Viking Representative for assistance in obtaining a complete inspection and additional replacement sprinklers. For additional details, see technical data sheets for specific device.

NOTE: If replacement foam concentrate is not immediately available, activate the preaction system portion of the foam/water system until the replacement concentrate arrives.

B. For emergency shut down of the complete system
   1. Close main water supply valve (9)
   2. Close concentrate control shut-off valve (8***) to eliminate the flowing of the foam concentrate to the hydraulically actuated Viking Halar® coated deluge CCV (D) and the concentrate controller (B)
   3. Open main drain
   4. Close tank water supply control valve (10) to reduce the pressure on the bladder tank (A)

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5. Completely drain system
6. Repair the damaged portion of the discharge system, or perform emergency maintenance as required
7. Return the riser and foam system to service by following the procedure listed in Section 6C, Steps 4 and 6 through 13

C. If the foam concentrate pipe system is damaged:
1. Close the concentrate control shut-off valve (8***) to eliminate the flowing of the foam concentrate to the hydraulically actuated Viking Halar® coated deluge CCV (D) and the concentrate controller (B)
2. Close the tank water supply control valve (10) to reduce the pressure on the bladder tank (A).
3. Verify that the Viking Halar® coated deluge CCV (D) is closed by observing water pressure gauge (13). If the water pressure gauge reads the same or higher than the system water pressure gauge located on the Viking preaction deluge valve (C), the Halar® coated Viking deluge CCV (D) is closed.
4. Repair the damaged portion of the foam concentrate piping system.
5. Return the foam concentrate system to service by following the procedure listed above in 6B, steps 3 thru 6.

NOTE: If there are no damaged sections of the distribution system, the preaction portion of the sprinkler system may be kept in service for protection, while repairs to the foam concentrate system are performed.