1. SYSTEM DESCRIPTION
The Pressure Regulating Deluge foam water proportioning system is a UL listed system, for use with National Foam and Viking Brand foam concentrate. This sprinkler system consists of a standard deluge sprinkler system, using a Viking flow control valve with pressure regulating deluge trim, a release module for the supplemental detection system, a concentrate controller, a hydraulically actuated Viking Halar® coated concentrate control valve, and foam concentrate UL listed and FM approved for use with The Viking System. This system was developed to provide constant discharge rates to eliminate over-discharge on deluge systems. It will provide constant pressure and water flow past the concentrate controller enabling the foam concentrate to be determined by the demand flow. The Viking Pressure Regulating Foam/Water Deluge System combines the advantages of a conventional foam deluge system, but without the required supply hydraulic calculation to provide for the over-discharge past the concentrate controller, which would deplete the concentrate supply prior to the required time duration. Water supply pressure to the bladder tank must be provided from a downstream source, after the pilot pressure regulating deluge valve, preferably between the discharge outlet of the deluge valve and the concentrate controller. The listed pressure differential for the pressure regulating trim is 15 PSIG (104–138 kPa). This means that the inlet pressure at the desired flow rate to the pressure regulating deluge valve has to be 15 psi higher than the desired pressure on the discharge side of the deluge valve.

In order to obtain the pressure differential between foam/water solution and supply water pressure, the pilot pressure regulating valve on the pressure regulating deluge trim must be adjusted to reduce the water pressure past the discharge side of the flow control valve. For best results the pilot pressure regulating deluge valve (D) should be set using the downstream pressure gauge (41) of the pilot pressure regulating deluge valve (D) and the water pressure gauge (38). For existing sprinkler systems which are restricted in flow and pressure capacity this system should not be used without supplementing the available supply pressure.

2. OPERATION
Actuation of the supplemental detection system (pneumatically or electrically) will release the priming water pressure in the deluge valve’s priming chamber allowing the deluge valve to open, filling the pre-action system with water. While water flows through the flow control valve, water will flow out a ½” (13 mm) port (supplied by contractor) on the discharge side of the flow control valve and pressurize the sensing end of the pressure operated relief valve (PORV), which will release the prime pressure of the Halar® coated concentrate control valve allowing it to open and supply foam concentrate to the concentrate controller. Foam/water solution will be proportioned throughout the system (normally 1%, 3%, or 6%). The bladder tank will be pressurized by the water passing through the deluge valve, through the piping and supply inlet to the bladder tank. System water pressure in the space between the flexible bladder and the inside surface of the tank causes the bladder to collapse, forcing foam concentrate out through the foam concentrate supply piping, Halar® concentrate control valve, and to the concentrate controller. The low venturi of the concentrate controller meters foam concentrate into the water stream passing by the concentrate controller. The listed minimum flow rate of the concentrate controller must be achieved before accurate proportioning will occur. Refer to the concentrate controller data pages behind the “Proportioning Devices” tab in the Viking Foam Design and Engineering Data Book.

3. DISCHARGE DEVICES
- Standard Spray Sprinklers
- Approved with Foam Concentrate and Fuel being protected.
- Non-Aspirating Spray Nozzles
- Manual Monitors or Oscillating Monitors
- Hose Reels and Hand Lines

4. GENERAL INSTRUCTIONS AND WARNINGS
A. Refer to the General Notes and Warnings at the end of the Design Section.
B. Refer to specific technical data sheets, acceptable installation standards, codes and Authority Having Jurisdiction for additional installation, operation and maintenance instructions.
C. Inspections – The system must be inspected and tested in accordance with NFPA 25. See Section 7 – 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, bladder tank, and appurtenances must be installed in an area not subject to freezing temperatures or physical damage.

5. DESIGN AND INSTALLATION
Warning: Locate all portions of the foam/water system subject to freezing in a heated area.
A. Refer to special notes on page 23e and the General Notes and Warnings on page 50a-d in the Design Notes of the foam data book.
B. Install the Flow control valve with pilot pressure regulating deluge trim in accordance with The
Viking Engineering and Data Book and Figure 23.

C. Install the Viking Concentrate Controller in the riser. (See Special Note A and B, Page 23e).

D. Install foam solution test valve (25) and system isolation valve (26). These valves are shown in an optional location based on the concentrate controller being downstream of the system riser valve. These test valves are required in accordance with NFPA 16 and NFPA 16A.

E. Install the Viking hydraulically actuated Halar® coated concentrate control valve (C) and associated trim as indicated in Figure 23, page 23d, trim charts or technical data pages.

F. Install bladder tank (A) in accordance with the manufacturer’s instructions with connections as shown on Figure 23, page 23d and herein described.

1. Locate the tank as close as practical to the system riser.
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 23. The bladder tank water supply piping (16) must be connected above the pilot pressure regulating deluge valve (D). Install the piping from the tank (A) to the Viking Concentrate Controller (C) as straight as possible.

5. All valves and devices should be located for easy access for operation and maintenance.

G. All valves should be closed, including the water supply control valve (8), the PORV water supply valve, the tank water supply control valve, the ½" ball valve, the concentrate control shut-off valve, and the foam solution test valve.

H. Pressurize System

1. Verify that the water supply control valve (8) is closed, close tank water supply control valve (15), then place the pilot pressure regulating deluge valve (D) in service as follows (See installation instructions on Viking Technical Data Sheet). Open system isolation valve (26) if closed.
2. Set release and detection system according to installation instructions for a deluge (Pneumatic or Electric release) system.
3. Prime the pilot pressure regulating deluge valve (D) by opening the priming valve on the deluge valve trim. Prime the Halar® coated concentrate control valve by opening the concentrate control priming valve (21). Bleed off any air pressure trapped in the priming line to the Viking Halar® coated concentrate control valve by opening the 3 way pressure gauge valve (27). Once air pressure has been relieved, close the 3 way valve to maintain pressure on gauge (27).
4. When pressure in the pilot pressure regulating deluge valve (D) and the concentrate control valve (C) priming chambers equal system water supply pressure, turn on system water supply by opening water supply valve (8), 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 (22**), to allow foam concentrate to flow slowly to the Viking Halar® coated concentrate control valve (D). With system fully set, fully open and secure water supply control valve (15).
6. Verify normal valve positions and secure in proper position. (See system components table)
7. Check for and repair any leaks.

I. Testing the foam concentrate swing check valve: After a flow test or proportioning test has been conducted, the foam concentrate swing check valve (24) should be checked to insure that it maintains a positive seal between the concentrate control deluge valve (C) and the deluge riser, by following the procedure outlined below.

1. Bleed off any pressure which may have been trapped between the outlet of the chamber of the concentrate control deluge valve (C) and the foam concentrate swing check valve (24) by placing a container under the foam concentrate auxiliary drain valve (29) and opening the valve slowly.
2. Drain excess foam concentrate into container. Should the leakage continue, check the priming pressure gauge (27) on the Viking Concentrate Control deluge valve to ensure that the valve is primed and closed.
3. If the foam concentrate auxiliary drain valve (29) continues to leak foam concentrate, then the concentrate control valve must be checked for proper operation and repaired if necessary. Follow the proceedure indicated in Section 6-D in the Wet Pipe Foam/Water System (page 101e) for repair.
4. Should water continue to leak from the foam concentrate auxiliary drain valve (29), the foam concentrate check valve (24) clapper rubber and seat should be maintained. Follow the procedure as indicated in Section 6-A in the Wet Pipe Foam/Water System (page 101e) for repair.

Performance Requirements

Viking pressure regulating deluge foam systems are available in sizes 1 ¼", 2", 3", 4", 6", and 8". For flow and
concentrate characteristics, see ILBP data pages 211a-e.

6. PLACING THE SYSTEM IN SERVICE OR REMOVING THE SYSTEM FROM SERVICE
Refer to Deluge Foam/Water System (Foam 20d & e for the pre-action portion of the system). Refer to the Viking Engineering Design Data Book, Pilot Pressure Regulating Deluge System data pages 521b for electric release, pages 522b for pneumatic release for placing the valve in service, setting the discharge pressure and testing the valve.

7. INSPECTION & MAINTENANCE
Refer to Pages 20e and f, Section 7, for inspection and maintenance instructions for the Deluge Foam/Water System. Refer to the Viking Engineering Design Data Book, Pressure Regulation section, equipment subsection, for information regarding the pressure regulating components of the system.

8. TROUBLE SHOOTING
Refer to Page 20e and f, Section 8, of the Viking foam data book for trouble shooting the deluge foam/water portion of the system. Refer to the Viking Engineering Design Data Book, Pressure Regulation, equipment subsection, for information regarding the pressure regulating components of the system.

9. EMERGENCY INSTRUCTIONS
Refer to the Viking foam data book, page 20e, for emergency instructions regarding the pre-action foam/water system portion of the system.

10. APPROVALS AND LISTINGS
As a complete Viking System, UL listed Viking Bladder tank – FM, UL. ASME Sect. VIII Certified
- Viking Pilot Operated Pressure Regulating Deluge trim - listed
- Viking Concentrate Controller – UL Listed and FM approved
- Viking Foam Concentrate and National Foam foam concentrate – UL Listed & FM Approved
- Viking Halar® Foam Concentrate Valve - UL Listed and FM Approved

Note: The Listings and Approvals for the Viking Pilot Pressure Regulating Foam System are based on a complete system as indicated and described in the Low Flow System Technical Data Section, pages 32a-e. Any alteration to the system configuration will void the listings and approvals as well as any Viking warranty.

11. REFERENCES
- Viking Model C-2 Pilot Pressure Regulating Data Page
- Viking Model H-1 Flow Control Valve
- Viking Foam Data Book Deluge Foam/Water Sprinkler page 20a-e
- Viking Foam Data Book Tanks
- Viking Foam Data Book Proportioners
- Viking Foam Data Book Valves Model E-2 Halar Coated Deluge Valves
- Viking Engineering Design Data Book, Pressure Regulation
Pilot Pressure Regulating Foam/Water Deluge System with Hydraulically Actuated Concentrate Control Valve

Figure 23

OBSOLETE
System Components for Figure 23 - Pilot Pressure Regulating Deluge System with Hydraulically Actuated Concentrate Control Valve

A. Foam Concentrate Bladder Tank complete with items 1-7
   1. Water drain/fill valve – Normally closed
   2. Fill line water 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 Foam Data pages 830a-u for specific details.
   6. Tank Water Vent Valve
      – Normally Closed
   7. Diaphragm Concentrate Vent Valve
      – Normally Closed

B. Viking Proportioning Devices
   23. Check valve
   30. Viking Concentrate Controller with Metering Orifice

C. Concentrate Control valve (CCV) - Hydraulically actuated Halar® coated Viking Deluge valve
   17. P.O.R.V. (connected to discharge side of Viking E-1 Deluge Valve)
   18. Restricted Orifice .125"
   19. ½" spring loaded check valve
   20. ½" Y strainer
   21. ½" ball valve – normally open
   27. Priming Water Pressure gauge and 3 way valve including CCV trim
   28. ½" priming line
   29. ½" foam concentrate auxiliary drain valve

D. Pilot Pressure Regulating Deluge valve
   31. Viking Model H-1 Flow Control Valve
   32. Viking Model C-2 Pilot Pressure Regulating Valve
   33. Viking Model A-2 Speed Control Assembly
   34. Check Valve
   35. Priming Valve
   36. Restricted Orifice
   37. Strainer
   38. Water Supply gauges
   39. Drain Valve
   40. Air Bleed Valve and Pressure gauge
   41. Downstream Pressure gauge
   42. Emergency release

Accessory Trim
(Order each item separately)
   8. Water supply control valve
      – Normally Open
   13. CCV release piping to PORV (installed and provided by contractor)

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 the turbulence inside the concentrate controller. Warning! If the outlet to the foam solution test valve (25") is located closer than 5 pipe diameters there may be turbulence at high flow rates.

B. The release of the concentrate control valve and the deluge valve must NOT be combined. The concentrate control valve must be primed and released separately of the pressure regulating deluge valve to ensure open position of the concentrate control valve clapper.

C. Figure 23 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.

D. 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.

E. A strainer is not required in the foam concentrate discharge piping (23) of bladder tank systems per NFPA Standards.

F. The foam deluge CCV (D) does not require any trim except for a ½" priming line (28), ½" auxiliary drain valve (29) and gauge with 3 way valve (27). 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 concentrate control Halar® coated deluge valve (C) required.