

FOAM SYSTEM SPECIFICATION

WET PIPE AFFF SPRINKLER SYSTEM

The sprinkler system shall be a closed-head wet pipe AFFF foam water sprinkler system designed to provide adequately proportioned foam water solution at listed water flows past proportioning device. System shall be installed in accordance with NFPA 16, Standard for the Installation of Closed Head Foam-Water Sprinkler Systems, NFPA 11, Standard for Low Expansion Foam, NFPA 13, Standard for Installation of Sprinkler Systems and all other applicable codes or requirements.

SYSTEM DEVICES

System Design

(Insert Applicable System Design.)

Alarm Valve

Wet sprinkler systems shall be equipped with an alarm valve designed to initiate an alarm during sustained water flow. The valve shall be UL Listed/Factory Mutual Approved for installation in the vertical or horizontal position and have an operating pressure up to 250 PSI (17 BAR). The valve shall be equipped with an external bypass to eliminate false water flow alarms and gauge connections on the system side and supply side of the valve clapper. Valve body to be ductile iron and trim galvanized. Alarm valve shall be Viking, Model J-1. Valve shall be trimmed with brass Model J-1 Trim. (No Substitutions Allowed)

Concentrate Controller (Proportioner)

Foam concentrate shall be introduced into the water flow by a concentrate controller utilizing balanced-pressure injection. Concentrate controller shall be a UL listed or FM approved device. Concentrate controller shall be listed and approved with the foam concentrate to be proportioned and the foam bladder tank. Concentrate controller shall be a brass, wafer or threaded type device. The concentrate controller shall be listed with a nominal orifice plate size for the foam concentrate to be proportioned. Concentrate Controller manufacturer to be Chemguard. (No Substitutions Allowed)

Foam Bladder Tank

Provide a low expansion foam bladder tank system for storage of the foam concentrate. The tank shall be stamped as meeting ASME pressure vessel requirements and UL Listed/FM Approved for use with the foam concentrate and proportioning method utilized. Foam bladder tank shall be located as close to the riser as practical and located to allow adequate access for filling and inspection. Connect bladder tank water supply to the system riser at or above the level of the top of the tank and provide a primary relief valve. Foam bladder tank shall be UL listed and FM approved. Bladder tanks shall be Chemguard Horizontal or Vertical Bladder Tanks. (No Substitutions Allowed)

Concentrate Control Valve

Install a deluge valve utilized as a concentrate control valve between the bladder tank and concentrate controller. The CCV valve shall open automatically when the sprinkler system experiences water flow. The CCV shall be UL Listed/FM Approved for use on fire protection systems and have an operating pressure up to 250 PSI (17 BAR) and utilize a 90° or straight-through pattern type of deluge valve manufactured with a corrosive resistant Halar coating. Concentrate control valve trim shall be compatible and installed following the manufacturer's installation instructions. Halar Coated Concentrate Control Valve shall be Viking Model E-2, E-4 or F-2. (No Substitutions Allowed)

Foam Concentrate Piping

Foam concentrate piping shall be compatible with foam concentrate to be used. Foam provider shall be consulted for acceptable materials of construction. Foam concentrate piping shall be designed for the least equivalent feet of pipe run from bladder tank discharge outlet to proportioning device and water supply to bladder tank. Excessive use of elbows and tees shall be avoided. Foam concentrate piping shall be substantially secured and restrained against movement, thrust and vibration. Foam concentrate piping shall be protected from excessive heat and freezing temperatures. Foam concentrate piping shall be installed with a fitting such as a grooved coupling or union to be readily removed between proportioning assembly and concentrate control valve.

Foam Concentrate

Synthetic Aqueous Film Forming Foam (AFFF) or Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF) shall be utilized. Water-soluble liquids shall be protected with Alcohol resistant type foam concentrate. Foam concentrates shall be UL Listed or FM Approved for the required application as well as for use with proportioning equipment and discharge devices. Stored foam concentrate shall not be a mixture of different types and/or brands and shall be stored in accordance with the manufacturer's guidelines. The AHJ should be consulted to determine reserve foam supply requirements. Foam concentrates shall be Chemguard Synthetic Foam Concentrates. (No Substitutions Allowed)

Discharge Devices

Closed head sprinklers that have been specifically tested and found suitable for the discharge of low expansion synthetic foam/water solution shall be installed. Standard sprinklers used for discharge outlets shall have been tested for minimum densities or minimum pressures as foam/water solution discharge outlets. Discharge devices shall be UL listed or FM approved for the application for which they are used. Closed head sprinklers shall be UL listed or FM approved for use with the foam concentrate being used. All sprinklers, which are to discharge foam/water solution, shall be Viking sprinklers. (No Substitutions Allowed)

Alarm Pressure Switch

Provide an alarm pressure switch to facilitate the transmission of an alarm during waterflow conditions. The switch shall be factory adjusted to operate with a pressure increase of 5-7 psi and waterflow equal to or in excess of the discharge from one sprinkler. The switch shall be cULus Listed/FM Approved for operating pressures up to 250 psi (17 BAR) and capable of being wired for a class A or class B circuit. Housing for the switch shall be NEMA 4 rated incorporating tamper-resistant screws. The alarm pressure switch shall be Potter PS101A or PS102A.

System Overhead Piping

Overhead sprinkler piping shall be in accordance with materials deemed acceptable by NFPA 13, Standard for the Installation of Sprinkler Systems, NFPA 16, Standard for the Installation of Foam-Water Sprinkler Systems and all other applicable building standards.

System Control Valve

Low Flow Foam system control valve shall consist of a listed indicating type of control valve. Control valve shall be listed for use in fire protection systems. Control valve shall be rated for system working water pressure not less than 175 PSI.

Hangers and Supports

System piping shall be substantially supported from the building structure. The installation of hangers and supports shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Materials used in the installation or construction of hangers and supports shall be listed and approved for such application. Hangers or supports not specifically listed for service shall be designed and bear the seal of a professional engineer.

Fire Department Connection

A system fire department connection shall be provided on the system riser in accordance with NFPA 16, Standard for Installation of Foam-Water Sprinkler Systems. Fire department connection shall be of a brass body with an integral clapper assembly to separate flow between inlets. Fire department connection shall be installed in an area accessible for the first response unit. Actual fire department location shall be installed and located only after proper coordination with fire officials. Fire department connection shall be UL listed and FM approved for fire protection use.

Underground Piping

Piping and fittings used for the installation of underground water mains shall be listed for such service. Local water system requirements shall be adhered to. Compatible fittings and connection methods shall be reviewed with the water department authority. Standards of the AWWA and NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances shall be minimum installation guidelines.

Drains and Flushing Connections

System drains shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Flushing connections shall be provided where system piping is subject to accumulation of sediments or where periodic flushing is required by the Authority Having Jurisdiction. System auxiliary drains shall be installed so that the drain valve is accessible and labeled as a sprinkler system drain. Drains shall terminate to the exterior of the building where practical. Drains that do terminate to the exterior shall be installed with a 45° elbow directed to a splash block or other permanent erosion limiting material.

Riser Test Connections

A test connection shall be provided on the system riser with a downstream isolation valve for the purpose of testing foam proportioning. System test header shall be of adequate size for at least a mid-range flow of the proportioning system. System test header shall be installed with a means of draining any trapped sections of discharge piping subject to freezing.

System Supervision

Control valves larger than 2" in size shall be equipped with UL listed and FM approved supervisory switches. Control valves 2" and smaller shall be sealed in the position of their normal operating condition. Others shall execute the termination of supervisory switch wires. Supervisory switches shall be Potter Electrical Signal Company Control Valve Supervisory Switch.

System Commissioning

Foam water sprinkler system shall be tested in accordance with NFPA 11, NFPA 13, NFPA 16 and all other applicable codes and jurisdictions. An owner's representative, local fire officials and a representative of the installing contractor shall witness foam-proportioning tests. Additional foam concentrate shall be provided for testing by the installing contractor. The installing contractor shall provide maintenance and material safety data sheets (MSDS) to the owner.

WET PIPE LOW FLOW FOAM SYSTEM

Sprinkler system shall be a closed-head wet-pipe AFFF foam sprinkler system designed to provide adequately proportioned foam water solution at low water flows past proportioning device. Proportioning system shall provide foam at initial fire conditions equal to or at a greater design percentage below the minimum listed flow of proportioning system. System shall be installed in accordance with NFPA 16, Standard for Installation of Foam-Water Sprinkler and Foam-Water Spray Systems, NFPA 13, Standard for Installation of Sprinkler Systems and all other applicable codes or requirements.

SYSTEM DEVICES

System Design

(Insert applicable system design.)

Low Flow Proportioning System

Low flow proportioning system shall be totally automatic and mechanical in nature. Electrical appliances, devices, valves and pumps shall be strictly prohibited. Proportioning system shall be of such a type that all valves, devices, foam bladder tanks and appurtenances are of a listed and approved assembly, with foam concentrate being supplied.

Low flow foam proportioning shall be accomplished by positive injection of foam concentrate of a higher pressure into a lower water pressure stream passing past the concentrate controller (proportioner), the differing pressures shall be "balanced" by means of a spool valve with an internal balanced design (ILBP).

The pressure difference (minimum 15 PSI) between the foam concentrate and the water pressure stream passing by the proportioning device shall be created by supplying the foam bladder tank with system supply pressure and reducing the discharge pressure of the system supply. A pilot operated pressure control valve, listed and approved as part of the proportioning system, shall be installed to reduce the supply pressure of the system riser.

The flow of water through the system riser shall cause the concentrate control valve to open, allowing foam concentrate to flow into the ILBP to be balanced to the existing water flow. The concentrate control valve shall automatically reset once the flow of water has ceased. The concentrate control valve shall be listed as a Halar coated fire protection valve and be of a right angle or straight through deluge valve design. Water flow in the system riser shall be directed past a listed and approved pilot operated pressure control valve to a listed and approved alarm valve. The alarm valve shall be utilized for water flow alarms and to release the prime pressure of the Concentrate Control Valve (CCV). CCV prime pressure is released when water flow from the alarm valve pressurizes the sensing end of the pressure operated relief valve (PORV) which vents the priming water causing the CCV priming chamber to drain.

Pilot Operated Pressure Control Valve

Wet-pipe low flow foam water sprinkler systems shall require a reduced discharge pressure at the system riser and shall employ the use of a listed and approved pilot operated pressure regulating valve that has been approved with the proportioning system. Wet pipe sprinkler systems that require reduced discharge pressure at the system riser shall employ a pilot operated pressure control valve assembly which consists of a Flow Control Valve, Speed Control Assembly, Pilot Pressure Regulating Valve, and all necessary trim. The pressure regulating valve shall be factory set and field adjustable to constant pressure regardless of inbound pressure fluctuations. The control valve and appurtenances shall be UL listed/FM Approved for water working pressures of 250 PSI (17 BAR). Pilot Operated Pressure Control Valve Assembly shall be Viking, Model A or B Series. (No Substitutions Allowed)

Foam Bladder Tank

Provide a low expansion foam bladder tank system for storage of the foam concentrate. The tank shall be stamped as meeting ASME pressure vessel requirements and UL Listed/FM Approved for use with the foam concentrate and proportioning method utilized. Foam bladder tank shall be located as close to the riser as practical and located to allow adequate access for filling and inspection. Connect bladder tank water supply to the system riser at or above the level of the top of the tank and provide a primary relief valve. Foam bladder tank shall be UL listed and FM approved. Bladder tanks shall be Chemguard Horizontal or Vertical Bladder Tanks. (No Substitutions Allowed)

Concentrate Control Valve

Install a deluge valve utilized as a concentrate control valve between the bladder tank and concentrate controller. The CCV valve shall open automatically when the sprinkler system experiences water flow. The CCV shall be UL Listed/FM Approved for use on fire protection systems and have an operating pressure up to 250 PSI (17 BAR) and utilize a 90° or straight-through pattern type of deluge valve manufactured with a corrosive resistant Halar coating. Concentrate control valve trim shall be compatible and installed following the manufacturer's installation instructions. Halar Coated Concentrate Control Valve shall be Viking Model shall be E-2, E-4 or F-2. (No Substitutions Allowed)

Foam Concentrate Piping

Foam concentrate piping shall be compatible with foam concentrate to be used. Foam provider shall be consulted for acceptable materials of construction. Foam concentrate piping shall be designed for the least equivalent feet of pipe run from bladder tank discharge outlet to proportioning device and water supply to bladder tank. Excessive use of elbows and tees shall be avoided. Foam concentrate piping shall be substantially secured and restrained against movement, thrust and vibration. Foam concentrate piping shall be protected from excessive heat and freezing temperatures. Foam concentrate piping shall be installed with a fitting such as a grooved coupling or union to be readily removed between proportioning assembly and concentrate control valve.

In-line Balanced Proportioner (ILBP)

In-line balanced proportioner (ILBP) shall be factory assembled and UL Listed/FM Approved with the foam concentrate and as an integral part of the complete system. The device shall be specifically tested for use with Viking Low Flow Foam Systems and include a concentrate controller and an internally balancing spool valve. ILBP shall have a foam inlet pressure at least 15 psi greater than the water inlet pressure up to a maximum foam inlet pressure of 200psi. Sprinkler contractor to install the water pressure sensing line on the system riser at least one pipe diameter below the concentrate controller. In-line Balanced Pressure Proportioner manufacturer to be Chemguard. (No Substitutions Allowed)

Alarm Valve

Wet sprinkler systems shall be equipped with an alarm valve designed to initiate an alarm during sustained water flow. The valve shall be UL Listed/Factory Mutual Approved for installation in the vertical or horizontal position and have an operating pressure up to 250 PSI (17 BAR). The valve shall be equipped with an external bypass to eliminate false water flow alarms and gauge connections on the system side and supply side of the valve clapper. Valve body to be ductile iron and trim galvanized. Alarm valve shall be Viking, Model J-1. Valve shall be trimmed with brass Model J-1 Trim. (No Substitutions Allowed)

Retard Chamber

Ported alarm connections on sprinkler riser valve to be piped to a retard chamber to absorb variable pressure surges. Alarm pressure switch to be installed on retard chamber with circuit vent trim to eliminate vapor or hydraulic lock against circuit closer. Retard Chamber manufacturer shall be The Viking Corporation. Model shall be C-1. (No Substitutions Allowed)

Foam Concentrate

Aqueous Film Forming Foam (AFFF) or Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF) shall be utilized. Water-soluble liquids shall be protected with Alcohol resistant type foam concentrate. Foam concentrates shall be UL Listed or FM Approved for the required application as well as for use with proportioning equipment and discharge devices. Stored foam concentrate shall not be a mixture of different types and/or brands and shall be stored in accordance with the manufacturer's guidelines. The AHJ should be consulted to determine reserve foam supply requirements. Foam concentrates shall be listed and approved for use with The Viking Corporation Low Flow Foam System. Foam concentrates shall be proportioned for a minimum 1%, 3% or 6% concentration in accordance with its listing. Foam concentrates shall be Chemguard Synthetic Foam Concentrates. (No Substitutions Allowed)

Discharge Devices

Provide closed head sprinklers that have been specifically tested and found suitable for the discharge of low expansion synthetic foam/water solution shall be installed. Standard sprinklers used for discharge outlets shall have been tested for minimum densities or minimum pressures as foam/water solution discharge outlets. Discharge devices shall be UL listed or FM approved for the application for which they are used. Closed head sprinklers shall be UL listed or FM approved for use with the foam concentrate being used. All sprinklers, which are to discharge foam/water solution, shall be Viking sprinklers. (No Substitutions Allowed)

Waterflow Pressure Switch

Provide an alarm pressure switch to facilitate the transmission of an alarm during waterflow conditions. The switch shall be factory adjusted to operate with a pressure increase of 5-7 psi and waterflow equal to or in excess of the discharge from one sprinkler. The switch shall be cULus Listed/FM Approved for operating pressures up to 250 psi (17 BAR) and capable of being wired for a class A or class B circuit. Housing for the switch shall be NEMA 4 rated incorporating tamper-resistant screws. The alarm pressure switch shall be Potter PS101A or PS102A.

System Overhead Piping

Overhead sprinkler piping shall be in accordance with materials deemed acceptable by NFPA 13, Standard for the Installation of Sprinkler Systems, NFPA 16, Standard for the Installation of Foam-Water Sprinkler Systems and all other applicable building standards.

System Control Valve

Low Flow Foam system control valve shall consist of a listed indicating type of control valve. Control valve shall be listed for use in fire protection systems. Control valve shall be rated for system working water pressure but in no case shall be listed for pressure less than 175 PSI.

Hangers and Supports

System piping shall be substantially supported from the building structure. The installation of hangers and supports shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Materials used in the installation or construction of hangers and supports shall be listed and approved for such application. Hangers or supports not specifically listed for service shall be designed and bear the seal of a professional engineer.

Fire Department Connection

A system fire department connection shall be provided on the system riser in accordance with NFPA 16, Standard for Installation of Foam-Water Sprinkler Systems. Fire department connection shall be of a brass body with an integral clapper assembly to separate flow between inlets. Fire department connection shall be installed in an area accessible for the first response unit. Actual fire department location shall be installed and located only after proper coordination with fire officials. Fire department connection shall be UL listed and FM approved for fire protection use.

Underground Piping

Piping and fittings used for the installation of underground water mains shall be listed for such service. Local water system requirements shall be adhered to. Compatible fittings and connection methods shall be reviewed with the water department authority. Standards of the AWWA and NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances shall be minimum installation guidelines.

Drains and Flushing Connections

System drains shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Flushing connections shall be provided where system piping is subject to accumulation of sediments or where periodic flushing is required by the Authority Having Jurisdiction. System auxiliary drains shall be installed so that the drain valve is accessible and labeled as a sprinkler system drain. Drains shall terminate to the exterior of the building where practical. Drains that do terminate to the exterior shall be installed with a 45° elbow directed to a splash block or other permanent erosion limiting material.

Riser Test Connections

A test connection shall be provided on the system riser with a downstream isolation valve for the purpose of testing foam proportioning. System test header shall be of adequate size for at least a mid-range flow of the proportioning system. System test header shall be installed with a means of draining any trapped sections of discharge piping subject to freezing.

System Supervision

Control valves larger than 2" in size shall be equipped with UL listed and FM approved supervisory switches. Control valves 2" and smaller shall be sealed in the position of their normal operating condition. Others shall execute the termination of supervisory switch wires. Supervisory switches shall be Potter Electrical Signal Company Control Valve Supervisory Switch.

System Commissioning

Foam water sprinkler system shall be tested in accordance with NFPA 11, NFPA 13, NFPA 16 and all other applicable codes and jurisdictions. An owner's representative, local fire officials and a representative of the installing contractor shall witness foam-proportioning tests. Additional foam concentrate shall be provided for testing by the installing contractor. The installing contractor shall provide maintenance and material safety data sheets (MSDS) to the owner.

FOAM DELUGE SYSTEM

Sprinkler system shall be an overhead deluge AFFF foam sprinkler system. System shall be designed to provide adequately proportioned foam water solution at listed water flows past proportioning device. System shall be installed in accordance with NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems, NFPA 11, Standard for Low Expansion Foam, NFPA 13, Standard for Installation of Sprinkler Systems and occupancy standards pertaining to the system installation.

SYSTEM DEVICES

System Design

(Insert Applicable System Design.)

Deluge Valve

Deluge systems shall utilize a 90° pattern or straight through type of deluge valve. Deluge valve shall employ a positive vent on the priming line to ensure that the deluge valve will not prematurely reset. Inlet and outlet connections of deluge valve can be threaded by threaded, flanged by flanged, flanged by grooved or grooved by grooved, respectively. Deluge valve shall be UL listed and FM approved. Deluge valve shall have a working pressure of 250 PSI. Valve trim shall be compatible and installed following the manufacturer's specifications. Deluge Valve shall be Viking Model E-1 or F-1. (No Substitutions Allowed)

Deluge Release System

Deluge valve shall utilize a listed and approved release system. One of the following methods shall be incorporated in the release system:

- A. Deluge systems utilizing hydraulic release of the deluge valve prime water pressure shall employ a rate-of-rise release detector, fixed temperature release or fire sprinkler in the release line piping. Rate-of-rise detector shall activate release when a rise of temperature greater than 15°F over the period of one minute is experienced. Rate-of-rise release shall have a means of installing a 155°F fixed temperature release on the device. Rate-of-rise release shall be automatically resetting. All devices used in the hydraulic release line shall be UL listed and meet FM Requirements. Rate-of-rise Release manufacturer shall be The Viking Corporation. Model shall be C-1. Fixed Temperature Release manufacturer shall be The Viking Corporation. Model shall be M. Fire sprinklers utilized in the release line shall be Viking Model M sprinklers. (No Substitutions Allowed)
- B. Deluge systems utilizing pneumatic pilot line release systems shall employ a rate-of-rise release detector, fixed temperature release or fire sprinkler in the release line piping. Rate-of-rise detector shall activate release when a rise of temperature greater than 15°F over the period of one minute is experienced. Rate-of-rise release shall have a means of installing a 155°F fixed temperature release on the device. Rate-of-rise release shall be automatically resetting. All devices used in the pneumatic release line shall be UL listed and meet FM Requirements. Rate-of-rise Release manufacturer shall be The Viking Corporation. Model shall be C-1. Fixed Temperature Release manufacturer shall be The Viking Corporation. Model shall be M. Fire sprinklers utilized in the release line shall be Viking Model M sprinklers. (No Substitutions Allowed)
- C. Deluge systems utilizing electric release systems shall utilize a release control panel and solenoid valve listed and approved for use with a Viking Deluge Valve. Detectors shall be compatible with release control panel. Release Control Panel shall be a Viking Model VFR400 Release Control Panel. (No Substitutions Allowed)

Concentrate Controller (Proportioner)

Foam concentrate shall be introduced into the water flow by a concentrate controller utilizing balanced-pressure injection. Concentrate controller shall be a UL listed or FM approved device. Concentrate controller shall be listed and approved with the foam concentrate to be proportioned and the foam bladder tank. Concentrate controller shall be a brass, wafer or threaded type device. The concentrate controller shall be listed with a nominal orifice plate size for the foam concentrate to be proportioned. Concentrate Controller manufacturer to be Chemguard. (No Substitutions Allowed)

Foam Bladder Tank

Provide a low expansion foam bladder tank system for storage of the foam concentrate. The tank shall be stamped as meeting ASME pressure vessel requirements and UL Listed/FM Approved for use with the foam concentrate and proportioning method utilized. Foam bladder tank shall be located as close to the riser as practical and located to allow adequate access for filling and inspection. Connect bladder tank water supply to the system riser at or above the level of the top of the tank and provide a primary relief valve. Foam bladder tank shall be UL listed and FM approved. Bladder tanks shall be Chemguard Horizontal or Vertical Bladder Tanks.

Concentrate Control Valve

Install a deluge valve utilized as a concentrate control valve between the bladder tank and concentrate controller. The CCV valve shall open automatically when the sprinkler system experiences water flow. The CCV shall be UL Listed/FM Approved for use on fire protection systems and have an operating pressure up to 250 PSI (17 BAR) and utilize a 90° or straight-through pattern type of deluge valve manufactured with a corrosive resistant Halar coating. Concentrate control valve trim shall be compatible and installed following the manufacturer's installation instructions. Halar Coated Concentrate Control Valve shall be Viking Model E-2, E-4 or F-2. (No Substitutions Allowed)

Foam Concentrate Piping

Foam concentrate piping shall be compatible with foam concentrate to be used. Foam provider shall be consulted for acceptable materials of construction. Foam concentrate piping shall be designed for the least equivalent feet of pipe run from bladder tank discharge outlet to proportioning device and water supply to bladder tank. Excessive use of elbows and tees shall be avoided. Foam concentrate piping shall be substantially secured and restrained against movement, thrust and vibration. Foam concentrate piping shall be protected from excessive heat and freezing temperatures. Foam concentrate piping shall be installed with a fitting such as a grooved coupling or union to be readily removed between proportioning assembly and concentrate control valve.

Foam Concentrate

Synthetic Aqueous Film Forming Foam (AFFF) or Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF) shall be utilized. Water-soluble liquids shall be protected with Alcohol resistant type foam concentrate. Foam concentrates shall be UL Listed or FM Approved for the required application as well as for use with proportioning equipment and discharge devices. Stored foam concentrate shall not be a mixture of different types and/or brands and shall be stored in accordance with the manufacturer's guidelines. The AHJ should be consulted to determine reserve foam supply requirements. Foam concentrates shall be Chemguard Foam Concentrates. (No Substitutions Allowed)

Discharge Devices

Open head sprinklers that have been specifically tested and found suitable for the discharge of low expansion synthetic foam/water solution shall be installed. Standard sprinklers used for discharge outlets shall have been tested for minimum densities or minimum pressures as foam/water solution discharge outlets. Discharge devices shall be UL listed or FM approved for the application for which they are used. Open head sprinklers shall be UL listed or FM approved for use with the foam concentrate being used. All sprinklers, which are to discharge foam/water solution, shall be manufactured by The Viking Corporation. (No Substitutions Allowed)

Alarm Pressure Switch

Provide an alarm pressure switch to facilitate the transmission of an alarm during waterflow conditions. The switch shall be factory adjusted to operate with a pressure increase of 5-7 psi and waterflow equal to or in excess of the discharge from one sprinkler. The switch shall be cULus Listed/FM Approved for operating pressures up to 250 psi (17 BAR) and capable of being wired for a class A or class B circuit. Housing for the switch shall be NEMA 4 rated incorporating tamper-resistant screws. The alarm pressure switch shall be Potter PS101A or PS102A.

System Overhead Piping

Overhead sprinkler piping shall be in accordance with materials deemed acceptable by NFPA 13, Standard for the Installation of Sprinkler Systems, NFPA 16, Standard for the Installation of Foam-Water Sprinkler Systems and all other applicable building standards.

System Control Valve

Low Flow Foam system control valve shall consist of a listed indicating type of control valve. Control valve shall be UL listed for use in fire protection systems. Control valve shall be rated for system working water pressure but in no case shall be listed for pressure less than 175 PSI.

Hangers and Supports

System piping shall be substantially supported from the building structure. The installation of hangers and supports shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Materials used in the installation or construction of hangers and supports shall be listed and approved for such application. Hangers or supports not specifically listed for service shall be designed and bear the seal of a professional engineer.

Fire Department Connection

A system fire department connection shall be provided on the system riser in accordance with NFPA 16, Standard for Installation of Foam-Water Sprinkler Systems. Fire department connection shall be of a brass body with an integral clapper assembly to separate flow between inlets. Fire department connection shall be installed in an area accessible for the first response unit; actual fire department location shall be installed and located only after proper coordination with fire officials. Fire department connection shall be UL listed and FM approved for fire protection use.

Underground Piping

Piping and fittings used for the installation of underground water mains shall be listed for such service. Local water system requirements shall be adhered to. Compatible fittings and connection methods shall be reviewed with the water department authority. Standards of the AWWA and NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances shall be minimum installation guidelines.

Drains and Flushing Connections

System drains shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Flushing connections shall be provided where system piping is subject to accumulation of sediments or where periodic flushing is required by the Authority Having Jurisdiction. System auxiliary drains shall be installed so that the drain valve is accessible and labeled as a sprinkler system drain. Drains shall terminate to the exterior of the building where practical. Drains that do terminate to the exterior shall be installed with a 45° elbow directed to a splash block or other permanent erosion limiting material.

Riser Test Connections

A test connection shall be provided on the system riser with a downstream isolation valve for the purpose of testing foam proportioning. System test header shall be of adequate size for at least a mid-range flow of the proportioning system. System test header shall be installed with a means of draining any trapped sections of discharge piping subject to freezing.

System Supervision

Control valves larger than 2" in size shall be equipped with UL listed and FM approved supervisory switches. Control valves 2" and smaller shall be sealed in the position of their normal operating condition. Others shall execute the termination of supervisory switch wires. Supervisory switches shall be Potter Electrical Signal Company Control Valve Supervisory Switch.

System Commissioning

Foam water sprinkler system shall be tested in accordance with NFPA 11, NFPA 13, NFPA 16 and all other applicable codes and jurisdictions. An owner's representative, local fire officials and a representative of the installing contractor shall witness foam-proportioning tests. Additional foam concentrate shall be provided for testing by the installing contractor. The installing contractor shall provide maintenance and material safety data sheets (MSDS) to the owner.

PREACTION FOAM/WATER SPRINKLER SYSTEM

Sprinkler system shall be an overhead pre-action AFFF foam sprinkler system. System shall be designed to provide adequately proportioned foam water solution at listed water flows past proportioning device. System shall be installed in accordance with NFPA 16, Standard for the Installation of Deluge Foam-Water Sprinkler and Foam-Water Spray Systems, NFPA 11, Standard for Low Expansion Foam, NFPA 13, Standard for Installation of Sprinkler Systems and occupancy standards pertaining to the system installation.

SYSTEM DEVICES

System Design

(Insert applicable system design.)

Deluge Valve

Preaction systems shall utilize a 90° pattern or straight through type of deluge valve. Deluge valve shall employ a positive vent on the priming line to ensure that the deluge valve will not prematurely reset. Inlet and outlet connections of deluge valve can be threaded by threaded, flanged by flanged, flanged by grooved or grooved by grooved, respectively. Deluge valve shall be UL listed and FM approved. Deluge valve shall have a working pressure of 250 PSI. Valve trim shall be compatible and installed following the manufacturer's specifications. Deluge Valve shall be Viking Model E-1 or F-1. (No Substitutions Allowed)

Concentrate Controller (Proportioner)

Foam concentrate shall be introduced into the water flow by a concentrate controller utilizing balanced-pressure injection. Concentrate controller shall be a UL listed or FM approved device. Concentrate controller shall be listed and approved with the foam concentrate to be proportioned and the foam bladder tank. Concentrate controller shall be a brass, wafer or threaded type device. The concentrate controller shall be listed with a nominal orifice plate size for the foam concentrate to be proportioned. Concentrate Controller manufacturer to be Chemguard. (No Substitutions Allowed)

Foam Bladder Tank

Provide a low expansion foam bladder tank system for storage of the foam concentrate. The tank shall be stamped as meeting ASME pressure vessel requirements and UL Listed/FM Approved for use with the foam concentrate and proportioning method utilized. Foam bladder tank shall be located as close to the riser as practical and located to allow adequate access for filling and inspection. Connect bladder tank water supply to the system riser at or above the level of the top of the tank and provide a primary relief valve. Foam bladder tank shall be UL listed and FM approved. Bladder tanks shall be Chemguard Horizontal or Vertical Bladder Tanks. (No Substitutions Allowed)

Concentrate Control Valve

Install a deluge valve utilized as a concentrate control valve between the bladder tank and concentrate controller. The CCV valve shall open automatically when the sprinkler system experiences water flow. The CCV shall be UL Listed/FM Approved for use on fire protection systems and have an operating pressure up to 250 PSI (17 BAR) and utilize a 90° or straight-through pattern type of deluge valve manufactured with a corrosive resistant Halar coating. Concentrate control valve trim shall be compatible and installed following the manufacturer's installation instructions. Halar Coated Concentrate Control Valve shall be Viking Model E-2, E-4 or F-2. (No Substitutions Allowed)

Foam Concentrate Piping

Foam concentrate piping shall be compatible with foam concentrate to be used. Foam provider shall be consulted for acceptable materials of construction. Foam concentrate piping shall be designed for the least equivalent feet of pipe run from bladder tank discharge outlet to proportioning device and water supply to bladder tank. Excessive use of elbows and tees shall be avoided. Foam concentrate piping shall be substantially secured and restrained against movement, thrust and vibration. Foam concentrate piping shall be protected from excessive heat and freezing temperatures. Foam concentrate piping shall be installed with a fitting such as a grooved coupling or union to be readily removed between proportioning assembly and concentrate control valve.

Ported Check Valve

Ported check valve shall be UL listed or FM approved. Ported check valve shall be listed for installation in the vertical or horizontal position. Ported check valve shall be approved for a maximum water working pressure of 250 PSI. Ported Check Valve and Trim manufacturer shall be The Viking Corporation. Model shall be E-1, F-1, Easy

Riser or L-1 or K-1 In-Line Check Valve, depending on riser size. (No Substitutions Allowed)

Foam Concentrate

Synthetic Aqueous Film Forming Foam (AFFF) or Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF) shall be utilized. Water-soluble liquids shall be protected with Alcohol resistant type foam concentrate. Foam concentrates shall be UL Listed or FM Approved for the required application as well as for use with proportioning equipment and discharge devices. Stored foam concentrate shall not be a mixture of different types and/or brands and shall be stored in accordance with the manufacturer's guidelines. The AHJ should be consulted to determine reserve foam supply requirements. Foam concentrates shall be Chemguard Synthetic Foam Concentrates. (No Substitutions Allowed)

Discharge Devices

Provide closed head sprinklers that have been specifically tested and found suitable for the discharge of low expansion synthetic foam/water solution shall be installed. Standard sprinklers used for discharge outlets shall have been tested for minimum densities or minimum pressures as foam/water solution discharge outlets. Discharge devices shall be UL listed or FM approved for the application for which they are used. Closed head sprinklers shall be UL listed or FM approved for use with the foam concentrate being used. All sprinklers, which are to discharge foam/water solution, shall be Viking sprinklers. (No Substitutions Allowed)

Alarm Pressure Switch

Provide an alarm pressure switch to facilitate the transmission of an alarm during waterflow conditions. The switch shall be factory adjusted to operate with a pressure increase of 5-7 psi and waterflow equal to or in excess of the discharge from one sprinkler. The switch shall be cULus Listed/FM Approved for operating pressures up to 250 psi (17 BAR) and capable of being wired for a class A or class B circuit. Housing for the switch shall be NEMA 4 rated incorporating tamper-resistant screws. The alarm pressure switch shall be Potter PS101A or PS102A.

System Overhead Piping

Overhead sprinkler piping shall be in accordance with materials deemed acceptable by NFPA 13, Standard for the Installation of Sprinkler Systems, NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems and all other applicable building standards.

System Control Valve

Low Flow Foam system control valve shall consist of a listed indicating type of control valve. Control valve shall be UL listed for use in fire protection systems. Control valve shall be rated for system working water pressure but in no case shall be listed for pressure less than 175 PSI.

Hangers and Supports

System piping shall be substantially supported from the building structure. The installation of hangers and supports shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Materials used in the installation or construction of hangers and supports shall be listed and approved for such application. Hangers or supports not specifically listed for service shall be designed and bear the seal of a professional engineer.

Fire Department Connection

A system fire department connection shall be provided on the system riser in accordance with NFPA 16, Standard for Installation of Foam-Water Sprinkler Systems. Fire department connection shall be of a brass body with an integral clapper assembly to separate flow between inlets. Fire department connection shall be installed in an area accessible for the first response unit; actual fire department location shall be installed and located only after proper coordination with fire officials. Fire department connection shall be UL listed and FM approved for fire protection use.

Underground Piping

Piping and fittings used for the installation of underground water mains shall be listed for such service. Local water system requirements shall be adhered to. Compatible fittings and connection methods shall be reviewed with the water department authority. Standards of the AWWA and NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances shall be minimum installation guidelines.

Drains and Flushing Connections

System drains shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Flushing connections shall be provided where system piping is subject to accumulation of sediments or where periodic flushing is required by the Authority Having Jurisdiction. System auxiliary drains shall be installed so that the drain valve is accessible and labeled as a sprinkler system drain. Drains shall terminate to the exterior of the building where practical. Drains that do terminate to the exterior shall be installed with a 45° elbow directed to a splash block or other permanent erosion limiting material.

Riser Test Connections

A test connection shall be provided on the system riser with a downstream isolation valve for the purpose of testing foam proportioning. System test header shall be of adequate size for at least a mid-range flow of the proportioning system. System test header shall be installed with a means of draining any trapped sections of discharge piping subject to freezing.

Compressed Air Supply

An air supply capable of restoring system pressure within 30 minutes shall be provided. Acceptable air supply arrangements are:

- A. Owner supplied air system with an air maintenance device on the supply side of the air supply inlet.
- B. A tank mounted air compressor with an air maintenance device between the air compressor and the air supply inlet on the system riser.

Supplemental Detection System

A supplemental detection system shall be provided for all preaction systems. Acceptable supplemental detection devices are:

- A. Pneumatic rate-of-rise compensating vent type detector with a fixed temperature release. (Insert product specification.)
- B. Pneumatic fixed temperature pilot operated release line. (Insert product specification.)
- C. Hydraulic rate-of-rise compensating vent type detector with a fixed temperature release. (Insert product specification.)
- D. Hydraulic fixed temperature pilot operated release line. (Insert product specification.)
- E. Electric fixed temperature self-restoring releases. (Insert product specification.)
- F. Electric smoke detection devices. Smoke detection devices to be compatible with system control panel. (Insert product specification.)

System Supervision

Control valves larger than 2" in size shall be equipped with UL listed and FM approved supervisory switches. Control valves 2" and smaller shall be sealed in the position of their normal operating condition. Others shall execute the termination of supervisory switch wires. Supervisory switches shall be Potter Electrical Signal Company Control Valve Supervisory Switch.

Deluge Valve Release Control Panel

If preaction system is to utilize electric release, the system release panel shall be capable of a dual system split release, dual system combined release, single system cross zone release, single system two zone release. Release panel shall be equipped with a local tone alarm to annunciate loss of A/C power, system trouble, circuit trouble and low auxiliary D/C power supply. Release panel shall be capable of supervising trouble and alarm audible alarms. Trouble and alarm audible alarms shall be able to be silenced at release panel. Release panel shall be housed in a vented enclosure with ambient temperature compatibility of 32°F to 120°F. Panel enclosure shall be of adequate size to house auxiliary D/C power supply. Auxiliary D/C power supply shall consist of (2) 12 volt lead acid batteries of the same ampere hour rating. Actual ampere hour rating to be established by auxiliary D/C power requirement. Release Panel manufacturer to be The Viking Corporation. Model shall be VFR400 Release Control Panel. (No Substitutions Allowed)

Solenoid Valve

Deluge valve priming water release device shall be an electrically operated solenoid valve when electric releases are used as the detection system. Solenoid valve shall be constructed of a ½" brass body with a stainless steel core tube, core, plugnut and springs. Solenoid valve shall have a maximum working pressure of not less than 175 PSI. Solenoid valve shall be UL listed and FM Approved for its intended use. Solenoid valve shall be FM Approved for use with Viking Model E or F Deluge Valves and Viking Model H or J Flow Control Valves. (No Substitutions Allowed)

Pneumatic Actuator

Preaction systems utilizing pneumatic release detectors shall employ a device between the detection and the operating systems. Such device shall actuate a release series in the deluge valve priming water supply. The actuator of the pneumatic release system shall be UL listed and FM approved for use with the deluge valve installed. Pneumatic Actuator manufacturer shall be The Viking Corporation. Model shall be H-1. (No Substitutions Allowed)

System Commissioning

Foam water sprinkler system shall be tested in accordance with NFPA 11, NFPA 13, NFPA 16 and all other applicable codes and jurisdictions. An owner's representative, local fire officials and a representative of the installing contractor shall witness foam-proportioning tests. Additional foam concentrate shall be provided for testing by the installing contractor. The installing contractor shall provide maintenance and material safety data sheets (MSDS) to the owner.

LOW FLOW PREACTION FOAM/WATER SYSTEM

Sprinkler system shall be an overhead preaction AFFF foam sprinkler system. System shall be designed to provide adequately proportioned foam water solution at listed water flows past proportioning device. System shall be installed in accordance with NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems, NFPA 11, Standard for Low Expansion Foam, NFPA 13, Standard for Installation of Sprinkler Systems and occupancy standards pertaining to the system installation.

SYSTEM DEVICES

System Design

(Insert applicable system design.)

Low Flow Proportioning System

Low flow proportioning system shall be entirely automatic. The concentrate control system shall utilize a foam bladder tank; electric foam pumps shall be strictly prohibited. Proportioning system shall be of such a type that all valves, devices, foam bladder tanks and appurtenances are of a listed and approved assembly, with foam concentrate being supplied.

Low flow foam proportioning shall be accomplished by positive injection of foam concentrate of a higher pressure into a lower water pressure stream passing past the concentrate controller (proportioner), the differing pressures shall be "balanced" by means of a spool valve of an internal balanced design (ILBP).

The pressure difference (minimum 15 PSI) between the foam concentrate and the water pressure stream passing by the proportioning device shall be created by supplying the foam bladder tank with system supply pressure and reducing the discharge pressure of the system supply. A pilot operated pressure regulating flow control valve, listed and approved as part of the proportioning system, shall be installed to reduce the supply pressure of the system riser.

The flow of water through the system riser shall cause the concentrate control valve to open, allowing foam concentrate to flow into the ILBP to be balanced to the existing water flow. The concentrate control valve shall automatically reset once the flow of water has ceased. The concentrate control valve shall be listed as a Halar coated fire protection valve and be of a right angle or straight through deluge valve design. Water flow in the system riser shall be directed past a listed and approved pilot operated pressure control valve to a listed and approved alarm valve. The alarm valve shall be utilized for water flow alarms and to release the prime pressure of the Concentrate Control Valve (CCV). CCV prime pressure is released when water flow from the alarm valve pressurizes the sensing end of the pressure operated relief valve (PORV) which vents the priming water causing the CCV priming chamber to drain.

Pilot Operated Pressure Control Valve

Preaction foam water sprinkler systems shall require a reduced discharge pressure at the system riser and shall employ the use of a listed and approved pilot operated pressure regulating valve that has been approved with the proportioning system. Preaction foam water sprinkler systems that require reduced discharge pressure at the system riser shall employ a pilot operated pressure control valve assembly which consists of a Flow Control Valve, Speed Control Assembly, Pilot Pressure Regulating Valve, and all necessary trim. The pressure regulating valve shall be factory set and field adjustable to constant pressure regardless of inbound pressure fluctuations. The control valve and appurtenances shall be UL listed/FM Approved for water working pressures of 250 PSI (17 BAR). Pilot Operated Pressure Control Valve Assembly shall be Viking, Model A or B Series. (No Substitutions Allowed)

Compressed Air Supply

An air supply capable of restoring system pressure within 30 minutes shall be provided. Acceptable air supply arrangements are:

- A. Owner supplied air system with an air maintenance device on the supply side of the air supply inlet.
- B. A tank mounted air compressor with an air maintenance device between the air compressor and the air supply inlet on the system riser.

Supplemental Detection System

A supplemental detection system shall be provided for all preaction systems. Acceptable supplemental detection devices are:

- A. Pneumatic rate-of-rise compensating vent type detector with a fixed temperature release. (Insert product specification.)
- B. Pneumatic fixed temperature pilot operated release line. (Insert product specification.)
- C. Electric fixed temperature self-restoring releases. (Insert product specification.)
- D. Electric smoke detection devices. Smoke detection devices to be compatible with system control panel. (Insert product specification.)

Deluge Valve Release Control Panel

If preaction system is to utilize electric release, the system release panel shall be capable of a dual system split release, dual system combined release, single system cross zone release, single system two zone release. Release panel shall be equipped with a local tone alarm to annunciate loss of A/C power, system trouble, circuit trouble and low auxiliary D/C power supply. Release panel shall be capable of supervising trouble and alarm audible alarms. Trouble and alarm audible alarms shall be able to be silenced at release panel. Release panel shall be housed in a vented enclosure with ambient temperature compatibility of 32°F to 120°F. Panel enclosure shall be of adequate size to house auxiliary D/C power supply. Auxiliary D/C power supply shall consist of (2) 12 volt lead acid batteries of the same ampere hour rating. Actual ampere hour rating to be established by auxiliary D/C power requirement. Release Panel shall be Viking Model VFR400 Release Control Panel. (No Substitutions Allowed)

Solenoid Valve

Flow control valve priming water release device shall be an electrically operated solenoid valve when electric releases are used as the detection system. Solenoid valve shall be constructed of a ½" brass body with a stainless steel core tube, core, plugnut and springs. Solenoid valve shall have a maximum working pressure of not less than 175 PSI. Solenoid valve shall be UL listed for its intended use. Solenoid valve shall be listed for use with Viking Model H or J Flow Control Valves. (No Substitutions Allowed)

Pneumatic Actuator

Preaction systems utilizing pneumatic release detectors shall employ a device between the detection and the operating systems. Such device shall actuate a release series in the deluge valve priming water supply. The actuator of the pneumatic release system shall be UL listed and FM approved for use with the deluge valve installed. Pneumatic Actuator shall be Viking Model H-1. (No Substitutions Allowed)

Foam Bladder Tank

Provide a low expansion foam bladder tank system for storage of the foam concentrate. The tank shall be stamped as meeting ASME pressure vessel requirements and UL Listed/FM Approved for use with the foam concentrate and proportioning method utilized. Foam bladder tank shall be located as close to the riser as practical and located to allow adequate access for filling and inspection. Connect bladder tank water supply to the system riser at or above the level of the top of the tank and provide a primary relief valve. Foam bladder tank shall be UL listed and FM approved. Bladder tanks shall be Chemguard Horizontal or Vertical Bladder Tanks. (No Substitutions Allowed)

Concentrate Control Valve

Install a deluge valve utilized as a concentrate control valve between the bladder tank and concentrate controller. The CCV valve shall open automatically when the sprinkler system experiences water flow. The CCV shall be UL Listed or FM Approved for use on fire protection systems and have an operating pressure up to 250 PSI (17 BAR) and utilize a 90° or straight-through pattern type of deluge valve manufactured with a corrosive resistant Halar coating. Concentrate control valve trim shall be compatible and installed following the manufacturer's installation instructions. Halar Coated Concentrate Control Valve shall be Viking Model shall be E-2, E-4 or F-2. (No Substitutions Allowed)

Foam Concentrate Piping

Foam concentrate piping shall be compatible with foam concentrate to be used. Foam provider shall be consulted for acceptable materials of construction. Foam concentrate piping shall be designed for the least equivalent feet of pipe run from bladder tank discharge outlet to proportioning device and water supply to bladder tank. Excessive use of elbows and tees shall be avoided. Foam concentrate piping shall be substantially secured and restrained against movement, thrust and vibration. Foam concentrate piping shall be protected from excessive heat and freezing temperatures. Foam concentrate piping shall be installed with a fitting such as a grooved coupling or union to be readily removed between proportioning assembly and concentrate control valve.

In-line Balanced Proportioner (ILBP)

In-line balanced proportioner (ILBP) shall be factory assembled and UL Listed/FM Approved with the foam concentrate and as an integral part of the complete system. The device shall be specifically tested for use with Viking Low Flow Foam Systems and include a concentrate controller and an internally balancing spool valve. ILBP shall have a foam inlet pressure at least 15 psi greater than the water inlet pressure up to a maximum foam inlet pressure of 200psi. Sprinkler contractor to install the water pressure sensing line on the system riser at least one pipe diameter below the concentrate controller. In-line Balanced Pressure Proportioner manufacturer to be Chemguard. (No Substitutions Allowed)

Ported Check Valve

Ported check valve shall be UL listed or FM approved. Ported check valve shall be listed for installation in the vertical or horizontal position. Ported check valve shall be approved for a maximum water working pressure of 250 PSI. Ported Check Valve and Trim manufacturer shall be The Viking Corporation. Model shall be E-1, F-1, Easy Riser or L-1 or K-1 In-Line Check Valve, depending on riser size. (No Substitutions Allowed)

Foam Concentrate

Synthetic Aqueous Film Forming Foam (AFFF) or Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF) shall be utilized. Water-soluble liquids shall be protected with Alcohol resistant type foam concentrate. Foam concentrates shall be UL Listed or FM Approved for the required application as well as for use with proportioning equipment and discharge devices. Stored foam concentrate shall not be a mixture of different types and/or brands and shall be stored in accordance with the manufacturer's guidelines. The AHJ should be consulted to determine reserve foam supply requirements. Foam concentrates shall be Chemguard Synthetic Foam Concentrates. (No Substitutions Allowed)

Discharge Devices

Provide closed head sprinklers that have been specifically tested and found suitable for the discharge of low expansion synthetic foam/water solution shall be installed. Standard sprinklers used for discharge outlets shall have been tested for minimum densities or minimum pressures as foam/water solution discharge outlets. Discharge devices shall be UL listed or FM approved for the application for which they are used. Closed head sprinklers shall be UL listed or FM approved for use with the foam and flammable liquid being protected. All sprinklers, which are to discharge foam/water solution, shall be Viking sprinklers. (No Substitutions Allowed)

Alarm Pressure Switch

Provide an alarm pressure switch to facilitate the transmission of an alarm during waterflow conditions. The switch shall be factory adjusted to operate with a pressure increase of 5-7 psi and waterflow equal to or in excess of the discharge from one sprinkler. The switch shall be cULus Listed/FM Approved for operating pressures up to 250 psi (17 BAR) and capable of being wired for a class A or class B circuit. Housing for the switch shall be NEMA 4 rated incorporating tamper-resistant screws. The alarm pressure switch shall be Potter PS101A or PS102A.

System Overhead Piping

Overhead sprinkler piping shall be in accordance with materials deemed acceptable by NFPA 13, Standard for the Installation of Sprinkler Systems, NFPA 16, Standard for the Installation of Foam-Water Sprinkler Systems and all other applicable building standards.

System Control Valve

Low Flow Foam system control valve shall consist of a listed indicating type of control valve. Control valve shall be listed for use in fire protection systems. Control valve shall be rated for system working water pressure but in no case shall be listed for pressure less than 175 PSI.

Hangers and Supports

System piping shall be substantially supported from the building structure. The installation of hangers and supports shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Materials used in the installation or construction of hangers and supports shall be listed and approved for such application. Hangers or supports not specifically listed for service shall be designed and bear the seal of a professional engineer.

Fire Department Connection

A system fire department connection shall be provided on the system riser in accordance with NFPA 16, Standard for Installation of Foam-Water Sprinkler Systems. Fire department connection shall be of a brass body with an integral clapper assembly to separate flow between inlets. Fire department connection shall be installed in an area accessible for the first response unit; actual fire department location shall be installed and located only after proper coordination with fire officials. Fire department connection shall be UL listed and FM approved for fire protection use.

Underground Piping

Piping and fittings used for the installation of underground water mains shall be listed for such service. Local water system requirements shall be adhered to. Compatible fittings and connection methods shall be reviewed with the water department authority. Standards of the AWWA and NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances shall be minimum installation guidelines.

Drains and Flushing Connections

System drains shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Flushing connections shall be provided where system piping is subject to accumulation of sediments or where periodic flushing is required by the Authority Having Jurisdiction. System auxiliary drains shall be installed so that the drain valve is accessible and labeled as a sprinkler system drain. Drains shall terminate to the exterior of the building where practical. Drains that do terminate to the exterior shall be installed with a 45° elbow directed to a splash block or other permanent erosion limiting material.

Riser Test Connections

A test connection shall be provided on the system riser with a downstream isolation valve for the purpose of testing foam proportioning. System test header shall be of adequate size for at least a mid-range flow of the proportioning system. System test header shall be installed with a means of draining any trapped sections of discharge piping subject to freezing.

System Supervision

Control valves larger than 2" in size shall be equipped with UL listed and FM approved supervisory switches. Control valves 2" and smaller shall be sealed in the position of their normal operating condition. Others shall execute the termination of supervisory switch wires. Supervisory switches shall be Potter Electrical Signal Company Control Valve Supervisory Switch.

System Commissioning

Foam water sprinkler system shall be tested in accordance with NFPA 11, NFPA 13, NFPA 16 and all other applicable codes and jurisdictions. An owner's representative, local fire officials and a representative of the installing contractor shall witness foam proportioning tests. Additional foam concentrate shall be provided for testing by the installing contractor. The installing contractor shall provide maintenance and material safety data sheets (MSDS) to the owner.

High Expansion Foam System

The sprinkler system shall be an open-head deluge foam water sprinkler system designed to provide adequately proportioned foam water solution at listed water flows past proportioning device. System shall be a high expansion foam system in accordance with NFPA 409, Standard on Aircraft Hangars; NFPA 11, Standard for Low-, Medium-, and High-Expansion Foam; NFPA 13, Standard for the Installation of Sprinkler Systems and all other applicable codes or requirements.

SYSTEM DEVICES

High Expansion Foam System Design

The high expansion foam system shall incorporate high expansion foam generators supplied by a foam deluge system. The high expansion foam generators will be installed symmetrically throughout the ceiling area and will be supplied with fresh air through a louver that will open upon activation of the high expansion foam system. The high expansion foam system will be designed in accordance with NFPA 409 and NFPA 11. The basis of design is utilizing generators as provided by The Viking Corporation. In accordance with NFPA 409, primary and reserve high expansion foam bladder tanks and two hand hose reels will be required.

Deluge Valve

Deluge or systems shall utilize a 90° pattern or straight through type of deluge valve. Deluge valve shall employ a positive vent on the priming line to ensure that the deluge valve will not prematurely reset. Inlet and outlet connections of deluge valve can be threaded by threaded, flanged by flanged, flanged by grooved or grooved by grooved, respectively. Deluge valve shall be UL listed and FM approved. Deluge valve shall have a working pressure of 250 PSI. Valve trim shall be compatible and installed following the manufacturer's specifications. Deluge Valve shall be Viking Model E-1 or F-1. (No Substitutions Allowed)

Deluge Release System

Deluge valve shall utilize a listed and approved release system. One of the following methods shall be incorporated in the release system:

- A. Deluge systems utilizing hydraulic release of the deluge valve prime water pressure shall employ a rate-of-rise release detector, fixed temperature release or fire sprinkler in the release line piping. Rate-of-rise detector shall activate release when a rise of temperature greater than 15°F over the period of one minute is experienced. Rate-of-rise release shall have a means of installing a 155°F fixed temperature release on the device. Rate-of-rise release shall be automatically resetting. All devices used in the hydraulic release line shall be UL listed or meet FM Requirements. Rate-of-rise Release manufacturer shall be The Viking Corporation. Model shall be C-1. Fixed Temperature Release manufacturer shall be The Viking Corporation. Model shall be M. Fire sprinklers utilized in the release line shall be Viking Model M sprinklers. (No Substitutions Allowed)
- B. Deluge systems utilizing pneumatic pilot line release systems shall employ a rate-of-rise release detector, fixed temperature release or fire sprinkler in the release line piping. Rate-of-rise detector shall activate release when a rise of temperature greater than 15°F over the period of one minute is experienced. Rate-of-rise release shall have a means of installing a 155°F fixed temperature release on the device. Rate-of-rise release shall be automatically resetting. All devices used in the pneumatic release line shall be UL listed or meet FM Requirements. Rate-of-rise Release manufacturer shall be The Viking Corporation. Model shall be C-1. Fixed Temperature Release manufacturer shall be The Viking Corporation. Model shall be M. Fire sprinklers utilized in the release line shall be Viking Model M sprinklers. (No Substitutions Allowed)
- C. Deluge systems utilizing electric release systems shall utilize a release control panel and solenoid valve listed and approved for use with a Viking Deluge Valve. Detectors shall be compatible with release control panel. Release Control Panel shall be a Viking Model VFR400 Release Control Panel. (No Substitutions Allowed)

Concentrate Controller (Proportioner)

Foam concentrate shall be introduced into the water flow by a concentrate controller utilizing balanced-pressure injection. Concentrate controller shall be a UL listed or FM approved device. Concentrate controller shall be listed and approved with the foam concentrate to be proportioned and the foam bladder tank. Concentrate controller shall be a brass, wafer or threaded type device. The concentrate controller shall be listed with a nominal orifice plate size for the foam concentrate to be proportioned. Concentrate Controller manufacturer to be Chemguard. (No Substitutions Allowed)

Foam Bladder Tank

Provide a low expansion foam bladder tank system for storage of the foam concentrate. The tank shall be stamped as meeting ASME pressure vessel requirements and UL Listed/FM Approved for use with the foam concentrate and proportioning method utilized. Foam bladder tank shall be located as close to the riser as practical and located to allow adequate access for filling and inspection. Connect bladder tank water supply to the system riser at or above the level of the top of the tank and provide a primary relief valve. Foam bladder tank shall be UL listed and FM approved. Bladder tanks shall be Chemguard Horizontal or Vertical Bladder Tanks. (No Substitutions Allowed)

Concentrate Control Valve

Install a deluge valve utilized as a concentrate control valve between the bladder tank and concentrate controller. The CCV valve shall open automatically when the sprinkler system experiences water flow. The CCV shall be UL Listed or FM Approved for use on fire protection systems and have an operating pressure up to 250 PSI (17 BAR) and utilize a 90° or straight-through pattern type of deluge valve manufactured with a corrosive resistant Halar coating. Concentrate control valve trim shall be compatible and installed following the manufacturer's installation instructions. Halar Coated Concentrate Control Valve shall be Viking Model shall be E-2, E-4 or F-2. (No Substitutions Allowed)

Foam Concentrate Piping

Foam concentrate piping shall be compatible with foam concentrate to be used. Foam provider shall be consulted for acceptable materials of construction. Foam concentrate piping shall be designed for the least equivalent feet of pipe run from bladder tank discharge outlet to proportioning device and water supply to bladder tank. Excessive use of elbows and tees shall be avoided. Foam concentrate piping shall be substantially secured and restrained against movement, thrust and vibration. Foam concentrate piping shall be protected from excessive heat and freezing temperatures. Foam concentrate piping shall be installed with a fitting such as a grooved coupling or union to be readily removed between proportioning assembly and concentrate control valve.

Foam Concentrate

C2 foam concentrate can be used with high expansion equipment to combat three-dimensional fires where total flooding is the objective (such as paint booths, paper warehouses, airplane hangars and mines). When used with high expansion equipment, C2 foam concentrate produces a stable blanket of bubbles that can quickly build up to help suffocate flames. The long lasting foam also helps to prevent re-ignition. Foam concentrates shall be UL Listed and or FM Approved for the required application as well as for use with proportioning equipment and discharge devices. Stored foam concentrate shall not be a mixture of different types and/or brands and shall be stored in accordance with the manufacturer's guidelines. The AHJ should be consulted to determine reserve foam supply requirements. Foam concentrates shall be Chemguard Foam Concentrates. (No Substitutions Allowed)

High Expansion Foam Generator

High Expansion foam generators shall be powered by the Foam solution driving the hydraulic (water) motor. The foam expansion will be achieved by spraying the solution onto a stainless steel screen with the air stream created by the fan attached to the motor forcing air through the screen to produce a mass of foam bubbles. Foam solution piping and discharge nozzles shall be of open design to allow passage of particles up to ¼" in diameter. The Generator housing construction shall consist of mild steel painted in red polyurethane enamel paint. High Expansion foam generators shall be UL listed for 2% High Expansion Foam concentrate. High Expansion Foam Generator manufacturer to be Chemguard. (No Substitutions Allowed)

Alarm Pressure Switch

Provide an alarm pressure switch to facilitate the transmission of an alarm during waterflow conditions. The switch shall be factory adjusted to operate with a pressure increase of 5-7 psi and waterflow equal to or in excess of the discharge from one sprinkler. The switch shall be cULus Listed/FM Approved for operating pressures up to 250 psi (17 BAR) and capable of being wired for a class A or class B circuit. Housing for the switch shall be NEMA 4 rated incorporating tamper-resistant screws. The alarm pressure switch shall be Potter PS101A or PS102A.

System Overhead Piping

Overhead sprinkler piping shall be in accordance with materials deemed acceptable by NFPA 13, Standard for the Installation of Sprinkler Systems, NFPA 16, Standard for the Installation of Foam-Water Sprinkler Systems and all other applicable building standards.

System Control Valve

Low Flow Foam system control valve shall consist of a listed indicating type of control valve. Control valve shall be

listed for use in fire protection systems. Control valve shall be rated for system working water pressure but in no case shall be listed for pressure less than 175 PSI.

Hangers and Supports

System piping shall be substantially supported from the building structure. The installation of hangers and supports shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Materials used in the installation or construction of hangers and supports shall be listed and approved for such application. Hangers or supports not specifically listed for service shall be designed and bear the seal of a professional engineer.

Fire Department Connection

A system fire department connection shall be provided on the system riser in accordance with NFPA 16, Standard for Installation of Foam-Water Sprinkler Systems. Fire department connection shall be of a brass body with an integral clapper assembly to separate flow between inlets. Fire department connection shall be installed in an area accessible for the first response unit; actual fire department location shall be installed and located only after proper coordination with fire officials. Fire department connection shall be UL listed and FM approved for fire protection use.

Underground Piping

Piping and fittings used for the installation of underground water mains shall be listed for such service. Local water system requirements shall be adhered to. Compatible fittings and connection methods shall be reviewed with the water department authority. Standards of the AWWA and NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances shall be minimum installation guidelines.

Drains and Flushing Connections

System drains shall adhere to the requirements set forth in NFPA 13, Standard for the Installation of Sprinkler Systems. Flushing connections shall be provided where system piping is subject to accumulation of sediments or where periodic flushing is required by the Authority Having Jurisdiction. System auxiliary drains shall be installed so that the drain valve is accessible and labeled as a sprinkler system drain. Drains shall terminate to the exterior of the building where practical. Drains that do terminate to the exterior shall be installed with a 45° elbow directed to a splash block or other permanent erosion limiting material.

Riser Test Connections

A test connection shall be provided on the system riser with a downstream isolation valve for the purpose of testing foam proportioning. System test header shall be of adequate size for at least a mid-range flow of the proportioning system. System test header shall be installed with a means of draining any trapped sections of discharge piping subject to freezing.

System Supervision

Control valves larger than 2" in size shall be equipped with UL listed and FM approved supervisory switches. Control valves 2" and smaller shall be sealed in the position of their normal operating condition. Others shall execute the termination of supervisory switch wires. Supervisory switches shall be Potter Electrical Signal Company Control Valve Supervisory Switch.

System Commissioning

Foam water sprinkler system shall be tested in accordance with NFPA 11, NFPA 13, NFPA 16 and all other applicable codes and jurisdictions. An owner's representative, local fire officials and a representative of the installing contractor shall witness foam-proportioning tests. Additional foam concentrate shall be provided for testing by the installing contractor. The installing contractor shall provide maintenance and material safety data sheets (MSDS) to the owner.

