

SECTION 21 13 13
WET-PIPE SPRINKLER SYSTEMS

05-08M

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Design, installation and testing shall be in accordance with NFPA 13 except for specified exceptions.
- B. The design and installation of a hydraulically calculated automatic wet system complete and ready for operation, for all portions of Boiler Building, including the support building.

1.2 RELATED WORK

- A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Section 33 10 00, WATER UTILITIES.
- C. Section 07 84 00, FIRESTOPPING, Treatment of penetrations through rated enclosures.
- D. Section 09 91 00, PAINTING.
- E. Section 21 12 00, FIRE-SUPPRESSION STANDPIPES.
- F. Section 28 31 00, FIRE DETECTION AND ALARM, Connection to fire alarm of flow switches, pressure switches and valve supervisory switches.
- G. Section 21 05 11 COMMON WORK RESULTS FOR FIRE SUPPRESSION

1.3 QUALITY ASSURANCE

- A. Installer Reliability: The installer shall possess a valid State of Florida fire sprinkler contractor's license. The installer shall have been actively and successfully engaged in the installation of commercial automatic sprinkler systems for the past ten years.
- B. Materials and Equipment: All equipment and devices shall be of a make and type listed by UL and approved by FM, or other nationally recognized testing laboratory for the specific purpose for which it is used. All materials, devices, and equipment shall be approved by the VA.
- C. Submittals: Submit as one package in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Prepare detailed working drawings that are signed by a NICET Level III or Level IV Sprinkler Technician or stamped by a Registered Professional Engineer practicing

in the field of Fire Protection Engineering. As Government review is for technical adequacy only, the installer remains responsible for correcting any conflicts with other trades and building construction that arise during installation. Partial submittals will not be accepted. Material submittals shall be approved prior to the purchase or delivery to the job site. Suitably bind submittals in notebooks or binders and provide index referencing the appropriate specification section. Submittals shall include, but not be limited to, the following:

1. Qualifications:

- a. Provide a copy of the installing contractor's fire sprinkler and state contractor's license.
- b. Provide a copy of the NICET certification for the NICET Level III or Level IV Sprinkler Technician who prepared and signed the detailed working drawings unless the drawings are stamped by a Registered Professional Engineer practicing in the field of Fire Protection Engineering.

2. Drawings: Submit detailed 1:100 (1/8 inch) scale (minimum) working drawings conforming to NFPA 13. Include a site plan showing the piping to the water supply test location.

3. Manufacturers Data Sheets:

- a. For existing fire pump, provide flow test curves in accordance with UL, FM, or the Foundation for Hydraulic Research and Cross-Connection Control to verify pressure loss calculations.
- b. Provide for materials and equipment proposed for use on the system. Include listing information and installation instructions in data sheets. Where data sheet describes items in addition to that item being submitted, clearly identify proposed item on the sheet.

4. Calculation Sheets: Submit hydraulic calculation sheets in tabular form conforming to the requirements and recommendations of NFPA 13.

5. Final Document Submittals: Provide as-built drawings, testing and maintenance instructions in accordance with the requirements in Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

Submittals shall include, but not be limited to, the following:

- a. One complete set of reproducible as-built drawings showing the installed system with the specific interconnections between the waterflow switch or pressure switch and the fire alarm equipment.

- b. Complete, simple, understandable, step-by-step, testing instructions giving recommended and required testing frequency of all equipment, methods for testing all equipment, and a complete trouble shooting manual. Provide maintenance instructions on replacing any components of the system including internal parts, periodic cleaning and adjustment of the equipment and components with information as to the address and telephone number of both the manufacturer and the local supplier of each item.
 - c. Material and Testing Certificate: Upon completion of the sprinkler system installation or any partial section of the system, including testing and flushing, provide a copy of a completed Material and Testing Certificate as indicated in NFPA 13.
 - d. Certificates shall document all parts of the installation.
 - e. Instruction Manual: Provide one copy of the instruction manual covering the system in a flexible protective cover and mount in an accessible location adjacent to the riser.
- D. Design Basis Information: Provide design, materials, equipment, installation, inspection, and testing of the automatic sprinkler system in accordance with the requirements of NFPA 13. Recommendations in appendices shall be treated as requirements.
- 1. Perform hydraulic calculations in accordance with NFPA 13 utilizing the Area/Density method. Do not restrict design area reductions permitted for using quick response sprinklers throughout by the required use of standard response sprinklers in the areas identified in this section.
 - 2. Sprinkler Protection: To determining spacing and sizing, apply the following coverage classifications:
 - a. Light Hazard Occupancies: Boiler Building support areas.
 - b. Ordinary Hazard Group 2 Occupancies: Storage rooms, trash rooms, clean and soiled linen rooms, pharmacy and associated storage, laundry, kitchens, kitchen storage areas, retail stores, retail store storage rooms, storage areas, building management storage, boiler plants, energy centers, warehouse spaces, file storage areas for the entire area of the space up to 140 square meters (1840 square feet) and Supply Processing and Distribution (SPD).
 - c. Request clarification from the Government for any hazard classification not identified.

3. Hydraulic Calculations: Calculated demand including hose stream requirements shall fall no less than 10 percent below the available water supply curve.
4. Water Supply: Base water supply on a flow test of:
 - a. Location Gainesville, Florida VAMC
 - b. Elevation Static Test Gauge _____ m
(_____ ft)
 - c. Elevation Residual Test Gauge _____ m
(_____ ft)
 - d. Static pressure: 861 kPa (125 psi)
 - e. Residual pressure: 792 kPa (115 psi)
 - f. Flow: 47 L/s (750 gpm)
 - g. Date: 3/30/16 Time
5. Zoning:
 - a. For each sprinkler zone provide a control valve, flow switch and a test and drain assembly with pressure gauge.

1.4 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. National Fire Protection Association (NFPA):
 - 13-2010.....Installation of Sprinkler Systems
 - 101-22003.....Safety to Life from Fire in Buildings and Structures (Life Safety Code)
 - 170-1999.....Fire Safety Symbols
- C. Underwriters Laboratories, Inc. (UL):
 - Fire Protection Equipment Directory - 2010
- D. Factory Mutual Engineering Corporation (FM):
 - Approval Guide - 2010
- E. Foundation for Cross-Connection Control and Hydraulic Research-2005

PART 2 PRODUCTS

2.1 PIPING & FITTINGS

- A. Sprinkler systems in accordance with NFPA 13.

2.2 VALVES

- A. Valves in accordance with NFPA 13.
- B. Do not use quarter turn ball valves for 50 mm (2 inch) or larger drain valves.

- C. The wet system control valve shall be a listed indicating type valve. Control valve shall be UL Listed and FM Approved for fire protection installations. System control valve shall be rated for normal system pressure but in no case less than 175 PSI. (No Substitutions Allowed).

2.3 FIRE DEPARTMENT SIAMESE CONNECTION

- A. Brass, exterior fire department connection with brass escutcheon plate, and a minimum of two 65 mm (2-1/2 inch) connections threaded to match those on the local fire protection service, with polished brass caps and chains. Provide escutcheon with integral raised letters "Standpipe and Automatic Sprinkler". Install an automatic ball drip between fire department connection and check valve with drain piping routed to the exterior of the building or a floor drain.

2.4 SPRINKLERS

- A. All sprinklers except "institutional" type sprinklers shall be FM approved. Provide quick response sprinklers in all areas, except where specifically prohibited by their listing or approval.
- B. Temperature Ratings: In accordance with NFPA 13.
- C. Sprinklers for the FIRECYCLE® III shall be open type compatible with an open deluge system in accordance with the manufacturer's recommendations

2.5 SPRINKLER CABINET

Provide sprinkler cabinet with the required number of sprinkler heads of all ratings and types installed, and a sprinkler wrench for each system. Locate adjacent to the riser. Sprinkler heads shall be installed in center of tile or center to center.

2.6 IDENTIFICATION SIGNS/HYDRAULIC PLACARDS

Plastic, steel or aluminum signs with white lettering on a red background with holes for easy attachment. Enter pertinent data for each system on the hydraulic placard.

2.7 SWITCHES:

- A. Contain in a weatherproof die cast/red baked enamel, oil resistant, aluminum housing with tamper resistant screws, 13 mm (1/2 inch) conduit entrance and necessary facilities for attachment to the valves. Provide two SPDT switches rated at 2.5 amps at 24 VDC.

- B. Water flow Alarm Switches: Mechanical, non-coded, non-accumulative retard and adjustable from 0 to 60 seconds minimum. Set flow switches at an initial setting between 20 and 30 seconds.
- C. Pressure Switches: Activation by any flow of water equal to or in excess of the discharge from one sprinkler. Water Flow Indicating Pressure Switch will activate an alarm by way of an alarm pressure switch. The alarm pressure switch shall be compatible with system devices. The alarm pressure enclosure shall be UL Listed and Factory Mutual Approved for the application in which it is used. The alarm pressure switch shall have the ability to be wired for Class A or Class B service.
- D. Valve Supervisory Switches for Ball and Butterfly Valves: May be integral with the valve.

2.8 WATER MOTOR GONG

Water powered mechanical device providing an audible signal when there is a flow of water in the automatic sprinkler system. Water flow will activate a hydraulic powered water motor alarm by way of integral valve alarm line trim piping. The water motor gong shall be connected to a water pressure retarding chamber to limit the propensity of unnecessary alarms. The water motor alarm shall be equipped with a rear closure plate to limit the access of foreign materials and accumulation of debris. The water motor alarm shall be UL Listed and Factory Mutual Approved for the application in which it is used.

2.9 GAUGES

PROVIDE GAUGES AS REQUIRED BY NFPA 13.2.10 PIPE HANGERS AND SUPPORTS

Supports, hangers, etc., of an approved pattern placement to conform to NFPA 13. System piping shall be substantially supported to the building structure. The installation of hangers and supports shall adhere to the requirements set forth in NFPA 13, Standard for 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.

2.10 WALL, FLOOR AND CEILING PLATES

Provide chrome plated steel escutcheon plates for exposed piping passing through walls, floors or ceilings.

2.11 FIRECYCLE® III SYSTEM

Deluge System

The fire sprinkler system shall be of the open sprinkler head deluge design. The deluge system shall be designed to limit the damage, which may be caused by excessive water flow. The deluge system shall be completely automatic and be designed for on/off operation. The method of detection shall be fixed temperature, self-restoring heat detectors. The on/off operation shall cycle when heat detector in each zone senses heat regeneration that zone control valve shall energize to flow water to that zone, when detector cools and restores, system operation shall cease. Water flow shall be controlled through a 90° pattern or straight-through pattern, spring aided flow control valve. Once system has operated, a strobe and alarm shall be activated at the control panel. The strobe and alarm will not deactivate until system is manually reset to normal operation.

The deluge system release control panel shall be equipped with the capability for a discharge time from 30 seconds to 15 minutes after the detector circuit has returned to no fire or no heat present condition. The flow control valve shall incorporate as part of the deluge design a positive venting, pressure operated relief valve (PORV). The deluge valve FIRECYCLE® III design shall utilize 2 electric solenoid valves; 1 normally open to set the PORV and 1 normally closed to retain the prime water pressure in the priming chamber. System shall be UL Listed and installed according to the manufacturer's installation guidelines.

SYSTEM DEVICES

Trim Package

The valve trim shall be a trim package for a flow control valve with a specific release device and release module for the desired application manufactured and tested in a metal enclosure. The metal enclosure shall be 16-gauge steel painted with a red epoxy powder coat. The standard trim normally required on a FIRECYCLE® III valve will be enclosed in this single cabinet. The FIRECYCLE® III shall provide access doors for the emergency release and alarm test valve for manual operation of these trim valves. The FIRECYCLE® III shall be equipped with priming water pressure and water supply gauge view-ports for easy monitoring of water pressures. The enclosure shall be designed to protect the trim valves from inadvertent

operation. The system shall be piped (or use the stainless steel hose package) from the valve body to the enclosure assembly. The FIRECYCLE® III Model E-2 can be utilized for cycling deluge systems with the Viking Model H-1 or J-1 Flow Control Valves in all sizes. The unit shall be rated for 250 PSI (1724 kPa). The Deluge Valve Trim shall be FIRECYCLE® III Cycling Deluge.

Water Control Valve

Sprinkler systems requiring a means of automatic or remote manual opening or closing of the water supply shall utilize a flow control valve with a spring aided clapper. The flow control valve shall be so constructed that the force of the spring and the differential of the valve clapper to water seat will close valve if detection or release system is reset. Valve body to be ductile iron. Valve trim shall be galvanized, compatible and listed for valve. Flow control valve shall be listed for a working pressure of not less than 250 PSI (17 BAR). Flow control valve shall be UL Listed and Factory Mutual Approved.

FIRECYCLE® III Release Control Panel

The control panel shall incorporate the necessary relays, timer, and alarm and trouble connections essential to the operation of a FIRECYCLE® III system. The release control panel shall be housed in a UL Listed and Factory Mutual Approved enclosure. The release control panel shall be equipped with 2 detection circuits - 1 detection circuit for normally open detectors and 1 detection circuit for normally close detectors. The release control panel shall accommodate a back-up power supply. The Release Control Panel shall be a Viking Model VFR400 Multi-Hazard Release Control Panel.

FIRECYCLE® III Detector

The normally closed detectors utilized in the detection system of the FIRECYCLE® III deluge system shall be fixed temperature, rate compensating detectors listed for use on the FIRECYCLE® III deluge system. The detector shall incorporate a zinc alloy tell-tale tab that shall drop away if the detector is subjected to temperatures of 800°F, indicating that the detector requires replacement. The heat probe utilized in the heat detector shall be constructed of stainless steel. The resistance drop across the detector in a closed position shall be 0.03 Ohms. The mounting box shall be constructed of copper free aluminum with ½" threaded connections and (2) 5/16" mounting lugs. The detector shall withstand 1500°F temperatures for short periods of

time without damage.

Detection System

The electrical devices utilized in the supplemental detection system shall be compatible with the water control valve release control panel.

Installation of electrical supplemental detection system shall be in accordance with N.F.P.A. 70, N.F.P.A. 72 and local installation requirements. An accessible detector shall be placed for annual testing of deluge system. Provide detectors as shown on contract documents

FIRECYCLE® III Detector Cable Installed In Conduit

Where local regulations require installation of detector cable in conduit, detector cable shall have a thermoplastic zero halogen jacket for use in conduit. The maximum nominal diameter of shielded detector cable shall be 0.305". Cable insulation jacket shall be constructed of Silicon rubber. The cable utilized to connect detectors utilized in cycling system shall be of a two-wire conductor of a gage wire of 16 AWG bare soft copper. The nominal resistance per 1000 Ft. of detector cable, at 68°F shall be 2.05 Ohms when connected per FIRECYCLE® III installation guidelines. The detector cable shall not propagate a fire. The detector cable shall not emit noxious fumes nor be toxic during a fire. The detector cable shall have the ability to cut to length in the field and spliced. The cable splicing must be made in a conduit box. The Detector Cable shall be manufactured for the Viking Corporation and shall have a part number of 09954.

System Piping

The system piping shall conform to N.F.P.A. 13, Standard for Installation of Sprinkler Systems. The system piping shall be listed for the maximum system pressure it is to be exposed to. All system piping shall be metallic and shall be protected against corrosion if corrosive conditions exist.

Hangers

The deluge sprinkler system hangers shall conform to N.F.P.A. 13, Standard for Installation of Sprinkler Systems. The system piping shall be substantially supported to prevent sway or thrust. The hanging of non-system components from the sprinkler piping shall be strictly prohibited. The use of non-metallic hanger materials shall be prohibited unless expressed otherwise.

Fittings

Pipe fittings installed on the deluge sprinkler system shall be in conformance with N.F.P.A. 13, Standard for Installation of Sprinkler Systems. The fittings shall be listed for use at the system pressures to be encountered. The fittings shall be corrosion resistant if they are to be installed in a corrosive atmosphere.

Flow Control Valve

Sprinkler systems requiring a means of automatic or remote manual opening or closing of the water supply shall utilize a flow control valve with a spring aided clapper. The flow control valve shall be so constructed that the force of the spring and the differential of the valve clapper to water seat will close valve if detection or release system is reset. The valve trim shall be compatible and listed for valve. Flow control valve shall be UL Listed and Factory Mutual Approved. Flow Control Valve manufacturer to be The Viking Corporation. Valve Model to be H-1 or J-1.

Fire Department Connection

A system fire department connection shall be provided on the system riser in accordance with N.F.P.A. 13, Standard for Installation of Sprinkler Systems. The fire department connection shall be of a brass body with an integral clapper assembly to separate flow between inlets. The fire department connection shall be installed in an area accessible for the first response unit. The fire department connection shall be UL Listed and Factory Mutual Approved for fire protection use.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be accomplished by the licensed contractor. Provide a qualified technician, experienced in the installation and operation of the type of system being installed, to supervise the installation and testing of the system.
- B. Installation of Piping: Accurately cut pipe to measurements established by the installer and work into place without springing or forcing. In any situation where bending of the pipe is required, use a standard pipe-bending template. Install concealed piping in spaces that have

finished ceilings. Install sprinklers so as not to obstruct the movement or operation of equipment. Sidewall heads may need to be utilized. Locate piping to prevent an obstruction to egress, provide piping clearances in accordance with NFPA 101.

- C. Welding: Conform to the requirements and recommendations of NFPA 13.
- D. Drains: Pipe drains to discharge at safe points outside of the building or to sight cones attached to drains of adequate size to readily carry the full flow from each drain under maximum pressure. Do not provide a direct drain connection to sewer system or discharge into sinks. Install drips and drains where necessary and required by NFPA 13.
- E. Supervisory Switches: Provide supervisory switches for sprinkler control valves.
- F. Waterflow Alarm Switches: Install waterflow switch and adjacent valves in easily accessible locations.
- G. Inspector's Test Connection: Install and supply in conformance with NFPA 13, locate in a secured area, and discharge to the exterior of the building.
- H. Affix cutout disks, which are created by cutting holes in the walls of pipe for flow switches and non-threaded pipe connections to the respective waterflow switch or pipe connection near to the pipe from where they were cut.
- I. Sleeves: Provide for pipes passing through masonry or concrete. Provide space between the pipe and the sleeve in accordance with NFPA 13. Seal this space with a UL Listed through penetration fire stop material in accordance with Section 07 84 00, FIRESTOPPING. Where core drilling is used in lieu of sleeves, also seal space. Seal penetrations of walls, floors and ceilings of other types of construction, in accordance with Section 07 84 00, FIRESTOPPING.
- J. Provide pressure gauge at each water flow alarm switch location and at each main drain connection.
- K. For each fire department connection, provide the symbolic sign given in NFPA 170 and locate 2400 to 3000 mm (8 to 10 feet) above each connection location. Size the sign to 450 by 450 mm (18 by 18 inches) with the symbol being at least 350 by 350 mm (14 by 14 inches).
- L. Firestopping shall comply with Section 07 84 00, FIRESTOPPING.
- M. Securely attach identification signs to control valves, drain valves, and test valves. Locate hydraulic placard information signs at each sectional control valve where there is a zone water flow switch.

- N. Repairs: Repair damage to the building or equipment resulting from the installation of the sprinkler system by the installer at no additional expense to the Government.
- O. Interruption of Service: There shall be no interruption of the existing sprinkler protection, water, electric, or fire alarm services without prior permission of the Contracting Officer. Contractor shall develop an interim fire protection program where interruptions involve in occupied spaces. Request in writing at least one week prior to the planned interruption.

3.2 INSPECTION AND TEST

- A. Preliminary Testing: Flush newly installed systems prior to performing hydrostatic tests in order to remove any debris which may have been left as well as ensuring piping is unobstructed. Hydrostatically test system, including the fire department connections, as specified in NFPA 13, in the presence of the Contracting Officer's Representative (COR) or his designated representative.
- B. Final Inspection and Testing: Subject system to tests in accordance with NFPA 13, and when all necessary corrections have been accomplished, advise COR/Resident Engineer to schedule a final inspection and test. Connection to the fire alarm system shall have been in service for at least ten days prior to the final inspection, with adjustments made to prevent false alarms. Furnish all instruments, labor and materials required for the tests and provide the services of the installation foreman or other competent representative of the installer to perform the tests. Correct deficiencies and retest system as necessary, prior to the final acceptance. Include the operation of all features of the systems under normal operations in test.

3.3 INSTRUCTIONS

Furnish the services of a competent instructor for not less than two hours for instructing personnel in the operation and maintenance of the system, on the dates requested by the COR/Resident Engineer.

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