

SECTION 21 10 00
WATER-BASED FIRE-SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The design and installation of a hydraulically calculated automatic fire sprinkler system complete and ready for operation, as indicated on the drawings in accordance with NFPA 13 and NFPA 14 the latest editions
- B. Existing piping to be reused, replaced or removed as indicated on the drawings. Removal of piping to include all valves, flow switches, supervisory devices, hangers, supports, and associated fire alarm system conduit and wire.
- C. Provide access doors or panels where control or drain valves are located behind plaster or gypsum walls or ceilings as necessary to install piping above suspended plaster or gypsum ceilings.
- D. Painting of exposed piping and supports to follow Section 09 91 00, PAINTING.

1.2 RELATED WORK

- A. Treatment of penetrations through rated enclosures: Section 07 84 00, FIRESTOPPING.
- B. Access panels for plaster ceilings: Section 08 31 13, ACCESS DOORS AND FRAMES.
- C. Painting of exposed pipe: Section 09 91 00, PAINTING.
- D. Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION.
- E. Alarm Supervision: Section 28 31 00, FIRE DETECTION AND ALARM.
- F. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.3 DESIGN CRITERIA

- A. The design, materials, equipment, installation, inspection, and testing of the automatic sprinkler system shall be in accordance with the required advisory provisions of NFPA 13 and 25.
- B. Base system design hydraulic calculations using the area/density method on the following criteria and in accordance with NFPA 13 latest edition.

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1. Sprinkler Protection:

- a. All patient care, treatment, office, waiting areas, educational areas, dining areas and corridors: Light hazard, (0.10 gpm/sq. ft.) over the hydraulically most remote 140 m² (1500 sq. ft.).
 - b. Mechanical Equipment and Storage Rooms between 9 and 23 m² (100 and 250 sq. ft.): Ordinary Hazard, Group 1, 6.1 L/minute/m² (0.15 gpm/sq. ft.) over the hydraulically most remote 140 m² (1500 sq. ft.).
 - c. Clean and Soiled Linen rooms and storage rooms over 23 m² (250 sq. ft.): Ordinary Group 2, 8.1 L/minute/m² (0.20 gpm/sq. ft.) over the hydraulically most remote 140 m² (1500 sq. ft.).
1. Add water allowance of 15 L/s (250 gpm) for inside and outside hose streams to the sprinkler requirements at the connection to the distribution main.
 2. Hydraulic Calculations: The calculated demand including hose stream requirements shall fall no less than 10 percent below the available supply curve.
- C. Provide a guard for each sprinkler located within Janitors' Closet 303D, Mechanical Room 326D and sprinklers within 2100 mm (7 ft.) of the floor and other areas as required by NFPA 13.
- D. Seismic Protection: Seismically brace all new and existing piping systems in accordance with Zone C of NFPA 13 latest edition.

1.4 QUALIFICATIONS:

- A. Designer's Qualifications: Design work and shop drawings shall be prepared by a licensed engineer practicing in the field of Fire Protection Engineering or a NICET (National Institute for Certification in Engineering Technologies) Level III sprinkler technician.
- B. Installer's Qualifications: The installer shall possess a valid State fire protection contractor's license. The installer shall provide documentation of having successfully completed three projects of similar size and scope.
- C. On-site emergency service within six hours notification.

1.5 SUBMITTALS

- A. Submit as one package in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

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- B. Sprinkler design shall be done by a certified professional. All plans shall be stamped by qualified P.E.
- C. Emergency service point of contact name and 24 hour emergency telephone number.
- D. Manufacturer's Literature and Data:
 - 1. Pipe and fittings.
 - 2. Valves
 - 3. Drips
 - 4. Sprinklers-each type, temperature and model
 - 5. Sprinkler Cabinets
 - 6. Sprinkler Plugs
 - 7. Pipe Hangers and Supports
- E. Detailed drawings in accordance with NFPA 13 the latest edition.
Drawings shall be prepared using CADD software stamped by fire protection professional engineer and include all new and existing sprinklers and piping. Use format in use at the VA medical center.
Drawings are subject to change during the bidding and construction periods. Any wall and ceiling changes occurring prior to the submittal of contractors shop drawings shall be incorporated into the contractors detailed design at no additional contract cost.
- F. Hydraulic calculations for each sprinkler system in accordance with NFPA 13 latest edition.
- G. Recommended preventive maintenance schedule.

1.6 AS-BUILT DOCUMENTATION

- A. A Mylar as-built drawing and two blue-line copies shall be provided for each drawing. One copy of final CADD drawing files shall also be provided on 89 mm (3 1/2 in.), 1.44 mb diskette, for each drawing.
- B. Four sets of manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
- C. Four sets of hydraulic calculations for each sprinkler system updated to include submittal review comments and any changes to the installation which affect the calculations including one electronic set in PDF format.
- D. Four copies of the hydrostatic report and NFPA 13 material and test certificate for each sprinkler system.

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- E. Four sets of operation and maintenance data updated to include submittal review comments and any equipment substitutions including one copy of NFPA 25.
- F. Manufacturers literature, hydraulic calculations, reports and operation and maintenance data shall be in a labeled 3-ring binder.

1.7 WARRANTY

- A. Water-based fire suppression system work shall be subject to the terms of Article "Warranty of Constuction" as stipulated in the front-end documents by the VAMC.

1.8 APPLICABLE PUBLICATIONS

- A. 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
 - 25-2011.....Inspection, Testing and Maintenance of water
Based Fire Protection Systems
 - 70-2011.....National Electrical Code
 - 72-2010.....National Fire Alarm Code
 - 170-2009.....Standards for Fire Safety Symbols
- C. Underwriters Laboratories Inc. (UL)
 - 2011.....Fire Protection Equipment Directory
- D. Factory Mutual Engineering Corporation (FM)
 - 2010.....Approval Guide
- E. Contractor shall provide all necessary test equipment, parts and labor to perform required maintenance.
- F. All inspections, testing and maintenance work required by NFPA 25, NFPA 13 and recommended by the equipment manufacturer shall be provided. Work shall include operation of sprinkler system alarm and supervisory devices.
- G. Maintenance and testing shall be performed on a quarterly basis. A computerized preventive maintenance schedule shall be provided and shall describe the protocol for preventive maintenance of equipment.

The schedule shall include a systematic examination, adjustment, and cleaning of all equipment.

- H. Non-included Work: Maintenance service shall not include the performance of any work due to improper use, accidents or negligence for what the contractor is not responsible.
- I. Service and emergency personnel shall report to the Engineering Office or their authorized representative upon arrival at the hospital and again upon the completion of the required work. A copy of the work ticket containing a complete description of work performed and parts replaced shall be provided.
- J. Emergency Service:
 - 1. Normal and overtime emergency call-back service shall consist of an on-site response to calls within four hours of notification.
 - 2. Overtime emergency call-back service shall be limited to minor adjustments and repairs to affect the integrity of the system.
 - 3. The sprinkler system must be operational before the responding service person leaves the facility.
- K. The contractor shall maintain a log at the fire pump controller. The log shall list the date and time of all examinations and trouble calls, condition of the system, and name of technician. Each trouble call shall be fully described, including the nature of the trouble, necessary correction performed, and parts replaced.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All devices and equipment shall be Underwriters Laboratories Inc. listed for their intended purpose. All sprinklers shall be Factory Mutual approved.

2.2 PIPING AND FITTINGS

- A. Sprinkler piping downstream of the isolation valve on wet-pipe systems shall be per NFPA 13 black steel, schedule 40 minimum.
- B. Threaded or flanged fittings shall be ANSI B1 6.3 cast iron, class 125 minimum. Threaded fittings are not permitted on pipe with wall thickness less than schedule 40.
- C. Slip type or clamp-on type rubber gasketed type fittings shall be listed for each piping application.

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D. Piping Materials Standards:

1. Wrought steel pipe - follow ANSI/ASME B36.10M

E. Fitting Materials Standards:

1. Malleable iron threaded fittings, Class 150 and 300 steel - follow ASME B16.3

F. Pipe Identification - All pipe, including specially listed pipe allowed by NFPA 13, shall be marked continuously along its length by the manufacturer in such a way as to properly identify the type of pipe. Pipe identification shall include the manufacturer's name, model designation, or schedule.

2.3 VALVES

- A. Drain Valves: Threaded bronze angle, globe, ball or butterfly, 4100 kPa (600 psi), Water or gas (WOG) equipped with reducer and hose connection with cap or connected to a drain line.

2.4 AUTOMATIC BALL DRIPS

- A. Cast brass 20 mm (3/4 in.) in line automatic ball drip with both ends threaded with iron pipe threads.

2.5 SPRINKLERS

- A. Quick response sprinklers shall be standard type except as noted below. The maximum distance from the deflector to finished ceiling shall be 50 mm (2 in.) for fully concealed sprinklers. All sprinklers shall be FM approved. Provide quick response sprinklers in all areas, except where specifically prohibited by their listing or approval, and the following:

| LOCATION | TYPE |
|---|---|
| Mechanical and Electrical Equipment Rooms | Quick Response, Upright or Pendent Brass 93°C (200°F) with head guard |
| All Areas Not Listed Above | Quick Response, Recessed Pendent, Chrome Plated, 66-74°C (150-165°F) |

- B. Do not use quick response sprinklers in the same sprinkler zone with other sprinklers types.
- C. Sprinklers to be installed as per NFPA 13.

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2.6 TOOLS AND REPLACEMENT PARTS

A. Sprinkler Cabinet:

1. Provide a minimum 5 percent spare sprinklers with escutcheons with a minimum of two of each type/or as required by NFPA-13, whichever is more demanding.
2. Provide a minimum of two of each type sprinkler wrenches used.
3. Install cabinets in each building where directed by the Resident Engineer.
4. Spare sprinklers shall be kept in a cabinet where ambient temperatures do not exceed 100 Deg F.

B. Provide three (3) sprinkler plugs attached to multi-section extension poles 2400 mm (8 ft.) minimum.

2.7 HANGERS AND EARTHQUAKE BRACING

- ### **A. In accordance with NFPA 13 and 14. Comply with seismic requirements as per 15050 for seismic zone locations.**

2.8 WALL, FLOOR AND CEILING PLATES

- ### **A. Exposed piping passing through walls, floors or ceilings shall be provided with chrome colored escutcheon plates.**
- ### **B. Comply with NFPA 101 Fire Barrier Penetration codes.**

2.9 HANGERS

- ### **A. Hangers shall be designed to support five times the weight of the water filled pipe plus 250 Lb (114Kg) at each point of piping support.**
- ### **B. These points of support shall be adequate to support the system.**
- ### **C. The spacing between hangers shall not exceed the value given for the type of pipe as indicated in NFPA 13 tables.**
- ### **D. Hanger components shall be ferrous.**
- ### **E. Detailed calculations shall be submitted, when required by the reviewing Authority, showing stress developed in hangers, piping, fittings and safety factors allowed.**

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Sprinkler Zone: Each sprinkler zone shall coincide with each smoke zone and fire alarm zone.
- B. Piping connections:
 - 1. Sprinkler System: Start at the existing flanged outlet, downstream of the floor control assembly as indicated on the drawings.
- C. Drains, Test Pipes and Accessories:
 - 1. Provide a drain at the base of risers, on valved piping sections, and at other locations for complete drainage of the system. Provide valve in drain lines and connect to the central drain riser. Discharge riser outside over splash block, indirectly over standpipe drain connected to storm sewer, or as indicated. The main drain shall be capable of full discharge test without allowing water to flow onto the floor.
 - 2. Provide test pipes in accordance with NFPA 13. Test pipes shall be valved and piped to discharge through proper orifice as specified above for drains.
- D. Conceal all piping, except in stairwells and rooms without ceilings.
- E. Install new piping and sprinklers aligned with building angles and other sprinklers lines.
- F. Locate piping in stairways as near to ceiling as possible to prevent tampering by unauthorized personnel. Provide minimum headroom of 2250 mm (7 ft.-6 in.) for all piping.
- G. Piping arrangement shall avoid contact with other piping and equipment and allow clear access to other equipment or devices requiring access or maintenance.
- H. Cutout disks, which are created by cutting holes in the walls of pipe for flow switches and non-threaded pipe connections, shall be affixed near to the pipe where the originated. They shall be displayed until final inspection and then removed.
- I. Fire-stopping shall comply with Section 07 84 00, FIRESTOPPING. All holes through stairways, smoke barrier walls, and fire walls shall be sealed on a daily basis.
- J. Install access doors in ceilings of rooms where above ceiling access is required.

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3.2 TEST

- A. Automatic Sprinkler System: NFPA 13 and 25.

3.3 INSTRUCTIONS

- A. Furnish the services of a competent instructor for not less than two four-hour periods for instructing personnel in the operation and maintenance of the fire pump and sprinkler system, on the dates requested by the COTR.

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