

**SECTION 21 13 13
COMBINED WET-PIPE SPRINKLER/STANDPIPE SYSTEMS**

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The entire Mental Health Services Building shall be protected with a hydraulically calculated combined wet-pipe fire sprinkler/standpipe system including the penthouse, mechanical equipment rooms, attic space, telephone rooms, elevator machine rooms, elevator pits, and linen chutes.
- B. Design, installation and testing shall be in accordance with NFPA 13, NFPA 14, and NFPA 20 except for specified sections.
- C. In addition to submittals specified in this section installing contractor shall be responsible for participating in updates to the BIM Model (Revit) as required by the conditions of the contract.

1.2 RELATED WORK

- A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Section 07 84 00, FIRESTOPPING, Treatment of penetrations through rated enclosures.
- C. Section 09 91 00, PAINTING.
- D. Section 21 05 11 COMMON WORK RESULTS FOR FIRE SUPPRESSION
- E. Section 21 10 02, FIRE PUMPING SYSTEMS
- F. Section 21 13 15 PRE-ACTION FIRE SUPPRESSION SYSTEMS
- G. Section 28 31 00, FIRE DETECTION AND ALARM, Connection to fire alarm of flow switches, pressure switches and valve supervisory switches.
- H. Section 33 10 00, WATER UTILITIES.

1.3 QUALITY ASSURANCE

- A. Installer Reliability: The installer shall possess a valid State of Washington 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 10 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 installer's Washington State fire protection 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.
 - c. Demonstrated experience in 3-D modeling using Revit for projects of a similar size and scope.
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 backflow preventers, provide flow test curves from 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 fire suppression system and the fire alarm equipment.
 - b. An electronic set of as-built drawings on a CD.
 - c. 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.
- d. 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.
 - e. Certificates shall document all parts of the installation.
 - f. Instruction Manual: Provide one copy of the instruction manual covering the system in a flexible protective cover and mounted 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 determine spacing and sizing, apply the following coverage classifications:
 - a. Light Hazard Occupancies: Patient care, treatment, office, assembly and customary access areas.
 - b. Ordinary Hazard Group 1 Occupancies: Laboratories, Mechanical Equipment Rooms, Transformer Rooms, Electrical Switchgear Rooms, Electric Closets, Elevator Shafts, Elevator Machine Rooms, Refrigeration Service Rooms, Repair Shops.
 - c. Ordinary Hazard Group 2 Occupancies: Storage rooms or areas, trash rooms, clean and soiled linen rooms, pharmacy and associated storage, laundry, kitchens, kitchen storage areas and shipping/receiving areas.
 - d. Request clarification from the Government for any hazard classification not identified.
 - e. Size standpipes to provide 100 psig at the most remote standpipe hose outlet connections. Standpipes shall provide 500 gpm at the hydraulically most remote standpipe riser outlet and 250 gpm at every other remote standpipe riser outlet to a maximum of 1,000 gpm as required by NFPA 14.
 3. Hydraulic Calculations: Calculated demand including hose stream requirements shall fall no less than 10 percent below the available water supply curve. Water supply for the Mental Health and Research Building Automatic Sprinkler system is based upon the fire pump system and adjacent water storage tanks.

4. Sprinkler system design shall be based upon on the capacity of the fire pump as identified in Specification Section 21 10 02, FIRE PUMPING SYSTEMS.
5. Zoning:
 - a. For each sprinkler zone provide a control valve, flow switch and a test and drain assembly with pressure gauge.
 - b. Provide sprinkler control valves at each floor level and to further subdivide floors into smoke barriers as shown on the contract drawings.
 - c. Provide sprinkler system control valve assemblies for the pre-action system located within the building. See Specification Section 21 13 15 PRE-ACTION FIRE SUPPRESSION SYSTEMS.
6. Provide earthquake sway bracing and seismic separation assemblies in accordance with NFPA 13.

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
 - 101-2009 Safety to Life from Fire in Buildings and Structures (Life Safety Code)
 - 170-2009 Fire Safety Symbols

SPEC WRITER NOTE: Specify the latest edition of the UL Fire Protection Equipment Directory.
- C. Underwriters Laboratories, Inc. (UL):
 - Fire Protection Equipment Directory – 2010
- D. Factory Mutual Engineering Corporation (FM):
 - Approval Guide – 2010
- E. International Building Code - 2009
- F. Foundation for Cross-Connection Control and Hydraulic Research-2005

PART 2 PRODUCTS

2.1 PIPING & FITTINGS

- A. Sprinkler piping shall **conform to ASTM A53, Type F** schedule 40 for piping **100** mm (**4**-inches) and smaller. Piping greater than **100** mm (**4**-inches) shall **conform to ASTM A53, Type F** schedule 40 or Schedule 10.

- B. Provide high pressure valves and fittings 2070 kPa (300 psig) minimum where pressures have the potential to exceed 175 psig on the discharge side of the fire pump.
- C. Threaded or flanged fittings shall be ANSI B 16.3 cast iron, class 125 minimum. Threaded fitting are not permitted on pipe with wall thickness less than Schedule 40.
- D. Clamp-on fittings with rubber gaskets shall be listed for the piping application.
- E. Plain end pipe, fittings with locking lugs or shear bolts are not permitted.

2.2 VALVES

- A. The wet system control valves shall be listed indicating type valves. Control valves shall be UL Listed and FM Approved for fire protection installations. System control valves shall be high pressure valves 2070 kPa (300 psig) minimum where pressures have the potential to exceed 175 psig on the discharge side of the fire pump. Control valves located downstream of pressure reducing/regulating valves shall be rated for normal system pressure but in no case less than 1200kPa (175 psig) WOG
- B. Listed Indicating Valves:
 - 1. Gate: OS&Y.
 - 2. Butterfly: Gear operated, indicating type,
- C. Check Valves: Swing type, rubber faced or wafer type spring loaded butterfly check valve. Valves shall be high pressure valves 2070 kPa (300 psig) minimum where pressures have the potential to exceed 175 psig on the discharge side of the fire pump. Check valves located downstream of pressure reducing/regulating valves shall be rated for normal system pressure but in no case less than 1200kPa (175 psig) WOGD.
- D. Drain Valves: Threaded bronze angle, globe, ball or butterfly, 1000 kPa (150 psig.) WOG equipped with reducer and hose connection with cap or connected to a drain line. Do not use quarter turn ball valves for 50 mm (2 inch) or larger drain valves.
- E. Standpipe Hose Valves: 65 mm (2-1/2 inch) screwed, brass hose angle valve, male hose threads same as local fire protection service, 65 mm (2-1/2 inch) by 40 mm (1-1/2 inch) reducer, and with permanently attached polished brass cap and chain. The hose valve shall be pressure regulating type, constant pressure under residual flow, adjustable pressure type, factory set and tamper proof, and set at 689 kpa (100 psi).
- F. Pressure reducing/regulating valves shall be UL listed in-line horizontal type, complete with all trim, 2070 kPa (300 psig) rated working pressure, provided prior to each sprinkler system floor control valve to limit system pressure so not to exceed 1207 kPa (175 psi). The valve shall control pressure by reducing the inlet pressure to a lower delivery pressure and automatically maintain that pressure regardless of higher inlet pressure fluctuations.

- G. Automatic Ball Drips: Cast brass 20 mm (3/4 inch) in-line automatic ball drip with both ends threaded with iron pipe threads.

2.3 FIRE DEPARTMENT SIAMESE CONNECTION

- A. Brass, exterior 4-way fire department connection with brass escutcheon plate, without sill cock, and a minimum of four 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 "Combined Automatic Sprinkler/Standpipe System". 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. Fire department connection is remote from building and shall be coordinated with the site civil drawings.

2.4 SPRINKLERS

- A. All sprinklers shall be FM approved. Sprinkler heads shall be quick response type in all areas except where prohibited by NFPA 13, such as high temperature areas, elevator shafts, or elevator machine rooms. Institutional sprinklers are not required.

- 1. Elevator shafts and elevator machine rooms: Standard response sprinklers.
- 2. Elevator pit: Standard response sprinklers.
- 3. In generator rooms: Standard response sprinklers.

(Note: Provide 'cages' to protect sprinkler heads from breakage/damage when the elevation of the head is less than 7 feet 6 inches above finished floor (mechanical rooms, janitor closets, etc).

- B. Temperature Ratings: In accordance with NFPA 13, except as follows:
 - 1. Sprinklers in elevator shafts, elevator pits, and elevator machine rooms: Intermediate temperature rated.
 - 2. Sprinklers in Generator Rooms: High temperature rated.
 - 3. Covered Courtyard: Intermediate temperature rated.
- C. Provide the type of sprinkler heads for specific locations as shown on the drawings.

2.5 SPARE SPRINKLER CABINET

- A. 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.

2.6 IDENTIFICATION SIGNS/HYDRAULIC PLACARDS

- A. 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 Butterfly Valves: May be integral with the valve.

2.8 GAUGES

- A. Provide gauges as required by NFPA 13.

2.9 PIPE HANGERS AND SUPPORTS

- A. 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

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

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.

Where ceiling mounted equipment exists, such as in operating and radiology rooms, install sprinklers so as not to obstruct the movement or operation of the equipment. Sidewall heads may need to be utilized. Locate piping in stairways as near to the ceiling as possible to prevent tampering by unauthorized personnel, and to provide a minimum headroom clearance of 2250 mm (seven feet six inches). 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 at 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). Fire department connection is remote from building and shall be coordinated with civil site drawings.
- 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.

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 Officers Technical Representative (COTR) or his designated representative. Test and flush underground water line prior to performing these hydrostatic tests.
- B. Final Inspection and Testing: Subject system to tests in accordance with NFPA 13, and when all necessary corrections have been accomplished, advise COTR/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

- A. 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 COTR/Resident Engineer.

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