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**SECTION 21 13 00**  
**FIRE PROTECTION FOR FIRE-SUPPRESSION SPRINKLER SYSTEMS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Wet-pipe sprinkler system.
- B. System design, installation, and certification.

**1.2 RELATED REQUIREMENTS**

- A. Section 21 05 00 - Fire Protection Common Work Results; for General Requirements.
- B. Section 21 05 00 - Fire Protection Common Work Results; Product Requirements.
- C. Section 21 05 00 - Fire Protection Common Work Results; Closeout Submittals.
- D. Section 22 00 00 - Plumbing Common Work Results; for additional requirements.
- E. Section 07 84 00 - Firestopping.
- F. Section 21 05 53 - Fire Protection Identification Piping and Equipment.
- G. Section 26 05 83 - Wiring Connections.
- H. Section 28 46 00 - Fire Detection and Alarm.

**1.3 REFERENCE STANDARDS**

- A. FM (AG) - FM Approval Guide Current Edition.
- B. IFC - International Fire Code; current edition.
- C. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL (DIR) - Online Certifications Directory Current Edition.
- E. FM Global - FM Data Sheets 8-2N

**1.4 SUBMITTALS**

- A. See Section 21 05 00 - Fire Protection Common Work Results; for submittal procedures.
- B. Listed manufacturers and series are for reference only and do not promote any single product. Series are provided for reference, and should not be used as an ordering model number. Accessories and options may be custom components purchased separately.
- C. Product Data: Provide manufacturer's most current catalog data sheet for equipment indicating rough-in size, finish, and accessories. Manufacturer's data sheets on each item of equipment and device, shall be clearly marked up to identify the items, accessories and options to be used on the project.
  - 1. Sprinklers and Guards (21 13 00 - 001 - A)
  - 2. Sprinkler Cabinet and Wrench (21 13 00 - 001 - A)
  - 3. Flexible drops (if used) (21 13 00 - 001 - A)
  - 4. Alarm Valves and Trim (21 13 00 - 002 - A)
  - 5. Electrical Alarm devices (21 13 00 - 002 - A)
    - a. Alarm Valves (21 13 00 - 002 - A)
    - b. Flow Switch (21 13 00 - 002 - A)
    - c. Tamper Switch (21 13 00 - 002 - A)
- D. Within 10 days of award of contract, submit controls installation team qualifications package. Package shall include the following information:

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1. Installation Contractor's name.
  2. Installation Contractor's address.
  3. Installation Contractor's field representative.
  4. Installation Contractor's engineer or NICET certified designer.
  5. Installing Contractor's standard 2 year service agreement for proposed system to be compliant with NFPA 25 and Local codes.
  6. Include cost for 2 year service agreement.
  7. Copy of NFPA 25 given to owner.
- E. Delegated Design Drawings:
1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
  2. Submit hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
  3. Submit shop drawings and delegated design drawings to authority having jurisdiction for approval. Submit proof of approval to Architect.
  4. Working plans signed and sealed by a professional engineer registered in the Commonwealth of Pennsylvania for the hydraulically designed fire protection systems showing all of the information required by NFPA 13 including drawings showing construction and location of all equipment, controls, sprinklers, piping, valves, drains, and sway bracing.
    - a. Show timing or phasing, if any, and how the work will be coordinated with other work.
    - b. Include copies of all cross-referenced drawings and documents.
    - c. Prepare drawings specifically for this project; marked up or over-drawn plumbing, electrical, HVAC, or other drawings are not acceptable, except for floor plans.
    - d. Use drawing scale of 1/8 inch to 1 foot or larger.
    - e. Include a complete equipment list, identifying manufacturer's model numbers and quantities, cross-referenced to product data submittal.
    - f. Include wiring diagrams for control panels and all electrical equipment, showing terminations and termination identifications.
    - g. Refer to NFPA 13, 2013, Chapter 22.1.3 for additional items.
  5. Working Plans (21 13 00 - 004 - A)
  6. Calculations (21 13 00 - 005 - A)
- F. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Refer to Section 21 05 00 - Fire Protection Common Work Results; for General Requirements.
  2. Piping installation in spaces, indicating coordination with general construction, building components, and other building services. include the following:
    - a. Ductwork.
    - b. Piping greater than 1 inch.
    - c. Electrical conduit greater than 2 inches.
    - d. Structural bracing and supports.
  3. Ceiling components.
  4. Structural members to which piping will be attached.
  5. Size and location of access panels.
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6. Penetrations of smoke barriers and fire-rated construction.
  7. Items penetrating finished ceiling including the following:
    - a. Lighting fixtures.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Grilles, registers and diffusers.
    - e. Access panels.
    - f. Perimeter moldings.
  8. Coordination drawings (21 13 00 - 006 -A)
  - G. Samples: Submit two of each style of sprinkler to be used on the project (not to be returned).
    1. Sprinkler Samples (21 13 00 - 007 -A)
  - H. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.
    1. Refer to Section 21 05 00 - Fire Protection Common Work Results; for Closeout Submittals.
    2. Submit under Section 21 05 00 - Fire Protection Common Work Results.
  - I. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.
  - J. Testing Certificates
    1. Flow Test (21 13 00 - 005 - A)
    2. System Test (21 13 00 - 006 - A)
      - a. Pressure switches
      - b. Flow Switches.
      - c. Tamper Switches
      - d. Fire alarm interconnection
  - K. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
    1. Submit under Section 21 05 00 - Fire Protection Common Work Results.
  - L. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    1. See Section 21 05 00 - Fire Protection Common Work Results; for additional provisions.
    2. Extra Sprinklers: Type and size matching those installed in quantity required by referenced NFPA design and installation standard.
    3. Sprinkler Wrenches: For each sprinkler type.
  - M. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.
  - N. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
    1. Submit under Operation and Maintenance Data books (21 05 00 - 006 -A)
    2. Alarm Valves and Trim
    3. Electrical Alarm devices
      - a. Alarm Valves
      - b. Flow Switch
      - c. Tamper Switch
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**1.5 QUALITY ASSURANCE**

- A. Maintain one copy of referenced design and installation standard on site.
- B. Conform to UL, FM, ITS (Warnock Hersey), NFPA, and IFC requirements.
- C. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience approved by manufacturer. Experience Record shall be submitted upon request.
- E. Equipment and Components: Provide products that bear UL, FM, and NFPA label or marking.

**1.6 WARRANTY**

- A. See Section 21 05 00 - Fire Protection Common Work Results; for additional warranty requirements.
- B. Provide 3 year warranty, including parts, materials and labor for defective parts, for the following:
  - 1. Include in Closeout Submittals Book.
  - 2. Alarm Valves and Trim.
  - 3. Electrical Alarm devices:
    - a. Alarm Valves.
    - b. Flow Switch.
    - c. Tamper Switch.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

**PART 2 PRODUCTS****2.1 REFER TO DIVISION 21 FOR BASIC MATERIAL REQUIREMENTS.****2.2 SPRINKLER SYSTEM**

- A. Sprinklers shall be FM approved, UL listed and meeting the requirements for the environment of which they are installed. Sprinklers required, but not listed may be submitted for approval.
  - B. Sprinkler System: Provide coverage for building areas noted in accordance with:
    - 1. NFPA 13 and NFPA 14
    - 2. Federal, State and Local codes
    - 3. Local Fire marshal
    - 4. International Building Codes.
    - 5. FM and UL Approved.
  - C. Space Occupancy Classification: Refer to drawings.
  - D. Water Supply: Determine volume and pressure from water flow test data. Contractor shall perform or engage water Authority to perform flow test for hydraulic calculations. Contractor shall pay associated costs.
  - E. Interface system with building fire and smoke alarm system.
  - F. Storage Cabinet for Spare Sprinklers and Tools: Steel, located where directed by Owner..
  - G. Pipe Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
    - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
    - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
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3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.

## **2.3 SPRINKLERS**

- A. Suspended Ceiling Type: Concealed pendant type with matching \_\_\_\_\_ cover plate.
  1. Response Type: Quick.
  2. Coverage Type: Standard.
  3. Finish: Chrome plated.
  4. Escutcheon Plate Finish: Chrome plated.
  5. Fusible Link: Glass bulb type temperature rated for specific area hazard.
  6. Cover: Flat round, white button cover.
- B. Exposed Area Type: Upright type with guard.
  1. Response Type: Quick.
  2. Coverage Type: Standard.
  3. Finish: Chrome plated.
  4. Fusible Link: Fusible solder link or glass bulb type temperature rated for specific area hazard.
  5. Guard: Hard wire cage, UL and FM approved. Guard and sprinkler must be compatible and rated together; Viking Series, D-1, or equal.
- C. Security Sprinklers: Recessed pendant or sidewall type with matching push on escutcheon plate institutional rating for suicide prevention and vandal proof.
  1. Response Type: Quick.
  2. Coverage Type: Standard.
  3. Finish: Chrome plated.
  4. Escutcheon Plate Finish: Chrome plated.
  5. Fusible Link: Fusible solder link or glass bulb type temperature rated for specific area hazard.
- D. Flexible Drop System: Stainless steel, multiple use, open gate type.
  1. Application: Use to properly locate sprinkler heads.
  2. Include all supports and bracing.
  3. Provide braided type tube as required for the application.
  4. Must have pressure drop within calculations.
  5. Manufacturers:
    - a. Victaulic Company; Vic-Flex.

## **2.4 PIPING SPECIALTIES**

- A. Wet Pipe Sprinkler Alarm Valve: Shut off OSY valve and tamper with flow switch and test connection.
    1. Coordinate electric connections and ratings with fire alarm vendor. Refer to Section 28 46 00 - Fire Detection and Alarm.
    2. Manufacturers:
      - a. Viking Series, Easy PAC Commercial Riser.
  - B. Test Connections:
    1. Inspector's Test Connection for Fire Protection Systems:
      - a. Provide test connections approximately 6 ft above floor for each or portion of each sprinkler system equipped with an alarm device, located at the riser location.
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- b. Route test connection to a floor drain location, excluding janitor sinks, accepting full flow without negative consequences or exterior.
    - 1) Test connection discharging to exterior must comply with the following:
      - (a) Provide concrete splash block.
      - (b) Provide termination 24 inches above finish grade.
      - (c) Termination shall be 1-1/2 inch hose connection at 45 degree angle.
      - (d) Must be itemized and explicit on design drawings.
  - C. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.
    - 1. Coordinate electric connections and ratings with fire alarm vendor. Refer to section 28 46 00 - Fire Detection and Alarm.
  - D. Tamper Switch: Trip rod switch for mounting horizontal or vertical, with two contacts; rated 15 amp at 125 volt AC and 2.5 amp at 30 volt DC.
    - 1. Coordinate electric connections and ratings with fire alarm vendor. Refer to section 28 46 00 - Fire Detection and Alarm.
  - E. Alarm Valves:
    - 1. Standard: UL 193.
    - 2. Design: For horizontal or vertical installation.
    - 3. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, and fill-line attachment with strainer.
    - 4. Drip Cup Assembly: Pipe drain with check valve to main drain piping.
  - F. Automatic (Ball Drip) Drain Valves:
    - 1. Standard: UL 1726.
    - 2. Pressure Rating: 175 psig minimum.
    - 3. Type: Automatic draining, ball check.
    - 4. End Connections: Threaded.

### **PART 3 EXECUTION**

#### **3.1 INTERFACE WITH WORK OF OTHER SECTIONS**

- A. Confirm framing and support members.
- B. Confirm rough-in and framing of walls and partitions with supports for equipment and accessories.
- C. Confirm rough-in locations and power requirements before rough-in installation. Refer to Section 28 46 00 - Fire Detection and Alarm.
- D. Confirm rough-in locations and power requirements before rough-in installation. Refer to Section 26 05 83 - Wiring Connections.

#### **3.2 INSTALLATION**

- A. Install products and system in accordance with the more stringent of:
    - 1. NFPA.
    - 2. FM Global.
    - 3. Contract Documents.
    - 4. Local Codes.
    - 5. Manufacturer's Requirements.
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- B. Sprinklers:
  - 1. Install sprinklers rated for the space, occupancy type and hazards located within the area they serve.
  - 2. Install sprinkler, piping to allow service and access to equipment.
  - 3. Center sprinklers in two directions in ceiling tile and provide piping offsets as required as indicated on construction documents.
  - 4. Apply paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
  - 5. Install guards on sprinklers at the following locations:
    - a. Where indicated on the drawings.
    - b. Storage rooms.
    - c. Mechanical rooms.
    - d. Exposed sprinkler locations.
- C. Install equipment in accordance with manufacturer's instructions.
- D. Provide approved backflow preventer assembly at sprinkler system water source connection.
- E. Piping:
  - 1. Place pipe runs for no obstruction to other work.
  - 2. Place piping in spaces above finished ceilings.
  - 3. Install sprinkler piping with drains for complete system drainage.
  - 4. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
  - 5. Flush entire piping system of foreign matter.
- F. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- G. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- H. Flush entire piping system of foreign matter.

### **3.3 TESTING**

- A. Fire Alarm System:
    - 1. Flow Switch.
    - 2. Tamper Switch.
    - 3. Alarm signals.
  - B. Wet Pipe System:
    - 1. Hydrostatically test entire system.
    - 2. Flush test, fill and inspect per NFPA 13, System Acceptance.
  - C. Require test be witnessed by Owner, Fire Marshal and authority having jurisdiction.
    - 1. Testing shall be coordinated with Owner 14 days in advance.
    - 2. Owner will observe all tests; tests conducted without Owner's authorized personnel in attendance will be considered invalid.
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3. Obtain Owner's approval of final acceptance test schedule at least 5 working days prior to the intended start of those tests.
- D. Furnish Report of Test.:
  1. Furnish report from NFPA 13, 2007 Chapter 24, Figure 24.1.
  2. Furnish plan showing extent of system testing.
  3. Furnish report of testing to Architect with 14 days of test.

### **3.4 INTERFACE WITH OTHER PRODUCTS**

- A. Ensure required devices are installed and connected as required to fire alarm system.

### **3.5 PROTECTION**

- A. Protect installed products from damage or painting due to subsequent construction operations. Install plastic covers over Sprinkler heads.
- B. Repair or replace painted or damaged sprinklers before Date of Substantial Completion.

**END OF SECTION 21 13 00**