

## SECTION 21 13 00 - FIRE-SUPPRESSION SPRINKLER SYSTEMS

### PART 1 GENERAL

#### 1.01 SUMMARY

##### A. Work Included:

1. Fabricate, install and secure necessary approvals for an Automatic Fire Sprinkler Systems.
2. Provide all materials and equipment, and perform all labor required to install a complete new fire protection systems from the new fire sprinkler riser locations indicated on the construction documents and continuing throughout the building in accordance with this specification, the current adopted edition of NFPA 24 & NFPA 13.
3. Provide personnel and materials to perform all acceptance tests, and to assist in inspections. Tests to be witnessed by the Authority Having Jurisdiction.
4. Provide all fire stopping material and installation labor, using UL Listed fire blocking systems, at all fire sprinkler system penetrations of fire rated assemblies.

#### 1.02 QUALITY ASSURANCE

##### A. Contractors and Manufacturers:

1. The performance of the work described in this Section is restricted to established Contractors and Manufacturers specializing in automatic fire sprinkler systems that have satisfactorily completed jobs of this size and type, who are acceptable to the Authority Having Jurisdiction. The Contractor shall hold a valid California C-16 contractor's license. The Contractor shall demonstrate satisfactory installations of comparable systems within the proceeding five years, and shall supply references.

##### B. Installation Responsibility:

1. The Contractor is hereby advised that the responsibility for the installation of the fire protection systems are totally that of the Contractor, and that all designs and resolutions proposed in the Shop Drawings, calculations, and related documentation must be demonstrated not only in the test procedure but also throughout the guarantee period.
2. The Systems specified herein are for defining installation intent and minimum performance requirements and may not be downgraded without written consent of the Architect, University and Authority Having Jurisdiction.

3. See Architect's Construction Documents for location requirements of fire sprinkler systems.
- C. Testing Laboratories: All material and equipment used in the installation of the fire protection systems shall be listed as approved by the Underwriters Laboratories, Inc., List of Fire Protection Equipment and Materials, or approved by other appropriate, nationally recognized testing laboratories for use in sprinkler systems, and shall be the latest design of the manufacturer.
- D. Requirements of Regulatory Agencies: Obtain necessary approvals from, have all materials approved by, and comply with requirements of all Authorities Having Jurisdiction.
- E. Coordinate and secure installation of fire service lines and connect to fire service laterals as required.
- F. Comply with the requirements of the currently adopted state editions of NFPA pamphlets 13 and 24.

#### 1.03 PRODUCTS AND SUBMITTALS

- A. Product Data: Complete materials list of items with available finishes proposed to be provided under this Section. The quality of materials required for this installation shall be that which comply with the requirements of the Authority Having Jurisdiction and the current edition of NFPA 13. All materials must be UL Listed for fire protection. All piping shall be free from rust.
- B. Shop Drawings:
  1. Prior to submitting product submittals to the Architect, indicate any changes to the locations of the following items on plans and submit to Architect and the University for review:
    - a. Sprinkler heads in finished rooms:
    - b. Grills and registers:
    - c. Light fixtures, speakers and smoke detectors:
    - d. All underground fire service piping, risers, backflow assemblies, thrust blocks and related appurtenances.
  2. Required fire sprinkler locations:
    - a. Corridors and halls: Align heads symmetrically so as not to conflict with other ceiling items.
    - b. Rooms: Center sprinkler heads in-line with other ceiling devices.

- c. Acoustical tile or panel ceilings: Locate heads in center of tile or panel.
- 3. Architect will review layout and may relocate or add sprinkler heads to achieve an orderly pattern of ceiling elements, at the Contractors sole expense.
- 4. If required by Architect, meetings will be held at their office to coordinate locations of sprinklers with other ceiling elements.
- 5. After obtaining Architect approval of any proposed fire sprinkler system changes from the approved Construction Documents, prepare product submittals for review by the Architect. Indicate all elements indicated in paragraph 1.3, B, 1 above, and any other required information.
- 6. Submit proposed changes or revisions of shop drawings to Architect for review and approval prior to work. Include details and sections as required to clearly define and clarify the design.
- 7. If changes to the approved Construction Documents are required and approved by the Architect and Engineer, the Contractor is to provide drawings, calculations and submittals to the California State Fire Marshal for approval.
- C. Project Record Documents:
  - 1. Submit three (3) copies of Project Record Documents
  - 2. Contractor to provide a completed and signed NFPA 13 Contractors Material and Test Certificate upon acceptance of the system by the Authority Having Jurisdiction.
- D. Operation/Maintenance Data and Warranty:
  - 1. Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the University and the Architect (3) copies of an Operation and Maintenance Manual. Include in each copy of the Manual of a copy of the Project Record Documents.
  - 2. The Contractor shall provide a minimum warranty of one year after final inspection and sign-off of the fire sprinkler system, including all parts, materials of construction and labor for the installation.
- E. General Piping Requirements
  - 1. Underground Piping: Provide an installation which is complete in all regards including, but not necessarily limited to:

- a. Provide fire service supply piping per the civil engineer's site water utility plan, fire sprinkler system Construction Documents, and site water line specification.
  - b. Connections from main to base of riser shall be as shown on project drawings. Piping shall terminate in a flanged fitting 1'-0" inches above finished floor.
  - c. When using approved PVC piping for underground supply piping, a transition shall be made to ferrous pipe shall be accomplished at the following locations:
    - 1) A minimum distance of five feet from a 90-degree elbow designed to supply a sprinkler riser.
    - 2) A minimum distance of five feet from the underground elbows on the supply and service side of an above ground exterior check valve and other above grade exposed piping, fittings, connections or valves.
    - 3) A minimum distance of five feet prior to entering a building.
    - 4) A minimum distance of five feet prior to passing under or through a footing or retaining wall.
  2. Above Grade Piping – All pipe shall be made in the USA domestically manufactured, and shall be UL Listed for Fire Protection System installation.
    - a. Flanged fittings shall be used at above grade exterior locations.
    - b. Connections and fittings shall be threaded, flanged, grooved, or welded.
    - c. Grooveless clamp or saddle fittings are not acceptable. Fittings and couplings shall be Class 125 (standard) weight minimum.
- F. Fire Sprinklers:
1. In soffits and interior ceilings: Reliable Semi-Recessed Quick Response Pendent (finish selected by architect) or approved equal.
  2. In hard ceilings: Reliable Semi-Recessed Quick Response Pendent (to be selected by architect) or approved equal. Finishes to be selected by Architect.
  3. Sidewall interior sprinkler to be Reliable Quick Response HSW (finish to be selected by Architect) or approved equal.
  4. Concealed spaces: Reliable Quick Response upright or pendants, brass finish, as approved for use.

G. Fire Sprinkler System Piping:

1. Pipe sized 1" thru 1-1/2": Use domestically manufactured Schedule 40 black steel pipe with threaded, banded cast or malleable iron fittings, or equivalent, UL Listed for fire protection.
2. Pipe sized 2" thru 8": Use domestically manufactured Schedule 10 black steel pipe with welded and/or grooved cast iron fittings of required pressure rating, UL Listed for fire protection.
3. Piping sized 8" and larger to be Schedule 10, UL Listed steel piping.

H. Fire Department Connection (FDC)

1. Provide appropriately sized (four inch or larger, depending on system design) freestanding pipe mount, cast brass FDC with 2-1/2-inch individually clappered fire department inlet connections with breakable cast iron domed caps, one-inch cast lettering. The Fire Department Connection shall be Potter Roemer Standard No. 5500 series, UL listed with a finish as selected by the Architect.
  2. Fire department connection shall be located where indicated on the Construction Documents. Note: Where conditions do not permit, the fire department connections shall be placed where readily accessible in case of fire and not liable to injury or fire exposure. All fire department connection locations shall be approved by the Authority Having Jurisdiction.
  3. Where subject to mechanical injury, protection shall be provided. The means of protection shall be approved and shall be arranged in a manner, which will not interfere with the connection to inlets.
  4. Maintain a 36-inch clear radius around the fire department connection. Grade variation within this radius shall not exceed 1:12. The fire department connection shall be arranged so that hose lines can be readily and conveniently attached to inlets without interference from any nearby objects including buildings, fences, posts, or other fire department connections.
  5. The fire department connection shall be clearly visible from the street and provided with identification sign as approved by the University Representative.
- I. Supervisory switch: Designed so that it will operate between the first and second revolution of the valve control wheel or when the stem moves no more than one fifth of the distance from its normal position or if the unit is removed from its mounting.
- J. Flow switch: All wetted parts of brass or stainless steel. Flow switch to be complete with retard setting providing 30 second delay before actuating.

- K. Valves: U.L. listed Kennedy, Nibco or Stockham or approved alternate. Valves shall be rated for minimum 175 psi working pressure zones.
- L. Pressure gauge: Bourdon spring pressure type with non-corrodible movements, set in cast iron case with black flange and with rings of pressed brass, flared type construction. Cases and rings black enamel finish. Gauges shall have 4-1/2" dials with white background, black lines and figures, calibrated for 2 times working pressure.  
Installation: Each gauge connected to its respective pipe line located where shown and at inlet and outlet of each pump, by means of suitable brass pipe, pigtails and fittings containing a brass cock, Ashcroft, U.S. Gauge Company or Crosby.
- M. Piping Seismic Separation Joints, where required, shall be Metraloop-Fireloop UL Listed Flexible Expansion Loops, as manufactured by the Metraflex Company Chicago, Illinois.
- N. Sprinkler Cabinet
  - 1. Provide cabinet containing spare sprinkler heads and equipment of the following type and number installed at an interior location nearest the wall at the system riser, in an accessible location as directed by Architect, and as approved by the California State Fire Marshal. Provide 6 sprinklers of each type used in the installation, with sprinkler wrenches.
  - 2. The cabinet shall be distinctly labeled, designating the type and quantity of equipment it contains.

#### 1.04 INSTALLATION AND EXECUTION

- A. Installation shall not be started until the submittal is approved by the California State Fire Marshal, the Architect of Record, and the Engineer of Record. The component submittals shall be stamped and signed by the qualified engineer registered in the State of California prior to submitting to the Authorities Having Jurisdiction.
- B. Install the work of this Section in strict accordance with the reviewed Shop Drawings and the requirements of the Authorities Having Jurisdiction. Relocate any heads not aligned with other ceiling fixtures or outlets at Contractors sole expense.
- C. Coordinate routing of sprinkler piping with all other trades that will be affected by the installation of the fire sprinkler system so as to avoid interferences. The cost of any field to work in place due to incomplete or inaccurate coordination revisions with other trades will be the responsibility of the Contractor.
- D. Maintain maximum clearances above ceilings. All piping to be concealed unless specifically noted otherwise on the plans.

- E. Install drains on main risers and auxiliary drains in accordance with standard practices and local ordinances. Install one Inspector's Test drain on each system and discharge to an approved exterior location where indicated on the project drawings and approved by the Architect.
- F. Access: Do not locate any device requiring access in walls or above ceilings of public areas without Architect's prior approval. Provide access doors complying with specifications and signs for all concealed devices.
- G. Piping, Hangers, Supports, Anchors and Sleeves: Install in complete accordance with NFPA 13 requirements, using UL Listed components by Tolco.
- H. Install all horizontal piping so as to run parallel to or perpendicular to the building walls, unless otherwise shown on the Drawings or approved by the Architect. Do not install sprinkler piping that obstructs any door openings.
- I. Guide and support all vertical risers or piping in accordance with standard practice. Fabricate and construct pipe joints so that they produce a true alignment of the pipe. Ream all pipe ends. Construct welded pipe joints in accordance with applicable codes.
- J. Run all piping in such a manner as to provide appropriate flexibility with respect to expansion and contraction. In general, accomplish this with flexible couplings, expansion loops and/or leads from mains with proper lengths and appropriate fittings. Anchor piping is required.
- K. Where exposed piping penetrates the floors, walls, or ceiling of finished areas, provide chromium plated pipe escutcheons at the penetrations.
- L. Provide pipe sleeves through partitions, walls, and slabs and outside walls for piping furnished and installed under this Section. Extend all vertical pipe sleeves in floor 6" above the finish.  
  
Provide Drawings showing openings for proper installation of the work specified.
- M. Provide all UL Listed hangers and supports required for the installation. Bracing the pipes to bottom flanges of steel beams is not permitted.
- N. Use hot dipped galvanized materials in any exterior or open spaces such as canopies or covered walkways.
- O. Clean pipe and fittings and keep interiors clean throughout installation. Provide caps on ends of cleaned piping.
- P. Use full pipe lengths; random lengths joined by couplings will not be accepted.

- Q. Provide for expansion and contraction of all pipes and for seismic movement. Provide reducing fittings for all changes in pipe size; provide fittings for all changes in pipe direction. Riser piping shall be installed plumb with offset fittings used where alignment adjustment is necessary.
- R. Provide unions for pipe sizes below two-inch and flanged or grooved fittings for sizes two-inch and above to permit disconnection of equipment and fixtures.
- S. Prepare all piping having welds for Authority Having Jurisdiction inspection prior to installation.
- T. On-site fire code welding permits shall be obtained from the Authority Having Jurisdiction.
- U. Piping arrangement shall avoid beams, columns, ducts, lighting fixtures, doors, windows, and similar obstructions for openings.
- V. All piping that penetrates fire rated construction shall be fire stopped in accordance with these specifications and project drawings.
- W. Underground Piping Installation
  - 1. All bolts, nuts, washers and rodding used for the installation of underground piping, valves and fittings from the riser flange back to, and including all parts of the water main tap shall be stainless steel conforming ASTM A194 Grade 8M or ASTM A320 Grade B8M. All of the above materials shall be thoroughly coated with bituminous mastic. After coating, all valves and ferrous fittings shall be wrapped in 8-mil polyethylene film and securely taped in place with underground tape. The above materials shall be left visible for inspection by the Authority Having Jurisdiction prior to backfilling.
  - 2. Install in accordance with referenced standards, codes, and manufacturer's instructions, and this specification.
  - 3. Piping shall have a minimum cover of three feet under driveways, fire lanes, roads, streets, and two- and one-half feet of cover in open areas. Cover shall be measured from finished grade to top of pipe. Provide a six-inch bed of sand below pipe and twelve-inch cover of sand above piping with locator tape on top of the sand.
  - 4. The depth of the bottom of all horizontal piping below grade shall not exceed the level distance measured from the pipe centerline to the nearest top edge of any adjacent building footing, unless approved by the Architect, shall have not less than 3 foot earth coverage.



5. Clearance shall be provided around all piping extending through floors, walls, platforms and foundations, including drains, fire department connections, and other auxiliary piping, in accordance with the provisions of NFPA 13.
  6. After underground work is complete and has been tested in accordance with referenced standards, the contractor shall complete a NFPA 24 Contractor's Material and Test Certificate for Private Fire Service Mains and provide it to the University Representative.
  7. Installation of underground water piping shall include concrete thrust blocks and anchors where vertical or horizontal deflection is 45 degrees or more, or at the intersection lines. Thrust block locations, design, and installation shall be in accordance with NFPA 24.
- X. Fire-Stopping: Fire stop all holes or voids created by penetrations of the Fire Sprinkler System piping through fire rated construction, with UL Listed Fire Stop / Block Systems appropriate for the rated construction penetration.

#### 1.05 TESTING

- A. All tests described and referenced in these specifications shall be performed by the Contractor in the presence of the Authority Having Jurisdiction and the University Representative. Tests and inspections shall apply to all water-sourced fire protection systems, including fire hydrants, sprinklers, standpipes, and all underground piping that is installed to supply these systems and devices.
- B. Hydrostatic Test Preparation:
1. Interior piping shall be filled with water for two (2) hours preceding hydrostatic testing.
  2. Piping shall be purged of all air and other gasses prior to hydrostatic testing.
  3. Underground piping shall be center loaded and all fittings, joints, strapping, and thrust blocking shall be exposed for hydrostatic pressure testing and inspection.
  4. All above grade and interior piping, fittings, sprinkler heads and supports shall be exposed for inspections and hydrostatic testing.
  5. A hydrostatic pre-test shall be conducted for both aboveground and underground piping prior to calling for Authority Having Jurisdiction final acceptance test. Written confirmation of passed 100% pre-test shall be given to the inspector of record prior to calling for final. All cost associated with delays caused by failure to complete 100% operational pre-test shall be borne by the contractor. A

Contractors Material and Test Certificate shall be filled out upon completion of testing.

- C. Fire department connections and piping shall be included in hydrostatic testing and shall be back flushed until clear water is observed.
- D. Underground mains and supply connections to sprinkler risers shall be flushed thoroughly before connections to sprinkler systems.
- E. Tests of drainage facilities shall be conducted by opening each drain valve while the system control valves are open to the supply.
- F. All water level sensors, alarm and supervisory signals, tanks and automatic valves shall be performance tested.
- G. Water remaining in normally dry piping shall be evacuated at completion of testing.
- H. Contractor to provide to the University completed copies of the forms depicted in Figure 25.1 "Contractor's Material and Test Certificate for Above Ground Piping" and Figure 10.10.1 "Contractor's Material and Test Certificate for Underground Piping" of the 2019 Edition of NFPA 13, upon completion of the system installation and approval by the California State Fire Marshal.

END OF SECTION 21 13 00