

**SECTION 21 1300  
FIRE PROTECTION SYSTEM**

**PART 1 GENERAL****1.01 SUMMARY**

## A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.

**1.02 WORK INCLUDED**

- A. All fire protection work, including connections to City water mains, detector check with meter in vault, vault pump, underground piping, post indicator valves, Fire Department connections, fire sprinkler risers, etc.
- B. The entire building including canopies shall be protected with a hydraulically calculated wet or dry pipe automatic fire sprinkler system. Based on a maximum velocity (ft. per sec.) of 25 feet per second.
- C. Any building areas, canopies, etc., that are subject to freezing conditions shall be protected with a dry pipe fire sprinkler system. Provide air compressor, dry pipe valve, etc., so system works properly. Riser/valve room shall be lighted and heated. The source of heat shall be permanently installed. Heat tape is not considered permanent and is not allowed.
- D. All related piping components and supporting and anchoring provisions.
- E. Installation and connection to sprinkler heads and other components.
- F. Excavation and backfilling.
- G. Shop Drawing preparation and submittals as hereinafter described.
- H. Testing, guarantees, and all other work necessary to provide a complete approved installation.
- I. Detector check and vault shall be installed per local City standard details.
- J. Provide all stub-outs as required for future building additions and/or as shown on Plan.

**1.03 RELATED WORK**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. All of Division 21 and Division 26 as applicable.

**1.04 SYSTEM DESCRIPTION**

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## A. Design Requirements:

1. System to provide coverage for the entire project.
2. Furnish and install sprinkler system to NFPA 13 requirements.
3. Office, Locker, Toilet Rooms, etc.
  - a. Density: 0.10 gpm/sq. ft. for most hydraulically remote 1500 square feet, with 100 gpm hose stream allowance. If area is less than 1500 square feet, calculate at 0.10 gpm/sq. ft. for entire area with 100 gpm hose stream allowance.

- b. Sprinkler Temperature Rating: Ordinary. High near heat-producing equipment.
  - c. Spacing: 225 sq. ft. per sprinkler (maximum).
  - d. Occupancy: Light Hazard per NFPA 13.
4. Shop area, parts storage, office storage, mechanical, and service drive.
- a. Density: 0.20 gpm/sq. ft. for most hydraulically remote 1500 square feet, with 250 gpm hose stream allowance. If area is less than 1500 square feet, calculate at 0.20 gpm/sq. ft. for entire area with 250 gpm hose stream allowance.
  - b. Sprinkler Temperature Rating: Ordinary. High near heat-producing equipment.
  - c. Spacing: 130 sq. ft. per sprinkler (maximum).
  - d. Occupancy: Ordinary Hazard Group #2.
5. The Fire Protection Contractor shall perform a water flow test to determine the available water supply for fire protection system design. The following parameters shall be followed in conducting the water flow test:
- a. Conduct flow test in accordance with NFPA 291. Coordinate flow tests validity with Public Authorities and Contracting Officer.
  - b. Contact the Public Authorities before conducting the flow test. Public Authority appointed representative must be present during the flow test.
  - c. Conduct a water flow pressure test as close to the proposed location as practical. The water flow pressure test shall consist of three separate pressure tests conducted at the same location. The first water flow pressure test shall be conducted at zero flow (initial static condition). The second water flow pressure test shall be conducted flowing at or more than 500 gpm (residual condition). The final water flow pressure test (final static condition) shall be conducted immediately following the second at zero flow, to determine if pumps or other pressure/flow modifying devices may have been engaged. Conduct test during peak hour demand conditions. If test cannot be conducted during peak hour, adjust results to peak hour demand.
6. Safety Factor: 10 psi, or 10 percent of static and residual PSI, whichever is greater.
7. Hydraulic calculation areas of application shall be based on actual floor area protected by sprinklers. Use 1.2 multiplied by the square root of the area for design criteria.
8. Hydraulic calculations for all Drypipe system piping shall be based on a C Value of 100.
9. Entire hose allowance (gpm) shall be included in hydraulic calculations at transition between underground supply piping and overhead system piping.
- B. Scope of Work: Design, fabrication, and installation of Fire Protection System Including the Following:
- 1. Complete fire protection system as outlined in these Contract Documents, including all labor, materials, shop drawings and hydraulic needed to furnish and install a complete and functional fire protection system. System shall comply with NFPA 13, Public Authorities, contracting Officer, and Contract Documents.
  - 2. Visit site to determine conditions and extent of work.
  - 3. Coordination of work with Contract Documents and all trades, including building design loads.
  - 4. The work under this section shall yield to all other trades.
  - 5. Warranty on new materials and labor.
  - 6. Provide all necessary permits, taxes and fees, including Public Authorities inspection and testing fees necessary to complete the specified work.
  - 7. Provide any required core drilling of walls, and required UL listed, noncombustible fire stopping materials at all new sprinkler piping penetrations. Patch as required. New piping

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- penetrations shall be adequately fire stopped to maintain the fire resistance rating required.
8. Access panels for service and access to valves in enclosed ceiling and walls.
  9. If required by Public Authorities provide a Fire Department lock-box, in size, type, and location as directed.
  10. Provide coordination and interface of alarm initiating and supervisory devices with the fire alarm system.
  11. The fire protection piping and sprinkler layout shall function in such a manner so as not to interfere with lighting fixtures, air distribution devices, equipment, piping, beams, and ductwork. The work under this section shall yield to all other trades.
  12. Furnish, install and adjust as necessary all water flow and valve supervisory switches.
  13. Fire protection systems complete with supervised control valves, inspector's test and main drain assemblies, vane type water-flow alarm switches, pressure gauge, main drain, auxiliary drains, and local alarm devices.
  14. Provide required signs at all new control valves, main drains, auxiliary drains and inspector's test connections, hydraulic placards, etc.
  15. System testing.
  16. Underground pipe modifications, including all necessary fittings, clamps, thrust blocking, back-flow preventers, excavating and back-filling, etc.
  17. Fire department connection with check valve and ball drip, including interconnecting supply piping to sprinkler riser.

### 1.05 SUBMITTALS

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- A. The submittal shall include the following.
  1. Product Data:
    - a. Sprinkler heads, valves, and specialties.
    - b. Performance ratings rough in details, weights, support requirements, and piping connections.
  2. Preliminary Shop Drawings: Prior to detailed submission, submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
  3. Shop Drawing Submittals
    - a. Shop Drawings shall include general pipe routing and sprinkler head locations. Submit hydraulic calculations and blue line prints of the working drawings for the entire system, including site piping, detailed building drawings showing building construction features, ductwork, lights, diffusers, ceiling tiles, equipment and obstructions to show that proper clearance is maintained for piping, sprinkler heads, etc. Indicate dimensional elevations and sizes of piping and provide sufficient sectional views so pipe routing can be checked for clearances. Refer to all other Contract Documents to confirm the exact disposition and number of sprinkler heads to be installed.
    - b. Final Shop Drawings shall first be submitted to all local agencies. Following their review and approval, submit to the Owner's insurance company. Following their signed approval, the Shop Drawings shall be sent to the Architect's office for review. If corrections required by any reviewing agent, or if review comments require extensive revisions, the submittal shall be revised as required and resubmitted for approval before submission to the Architect's office. Shop Drawings: Indicate hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories\_ Indicate system controls. Prior to

commencement of installation, submit sprinkler system drawings to Architect. Include system hydraulic calculations and equipment data. Submittals shall be complete and in bound sets. Sprinkler system drawings, prepared according to NFPA 13 and FM 2-8N and Contract Documents. Submittals shall be made to Architect. Designated Reviewers are:

- c. Assurance/Control Submittals:
  - 1) Design Data:
  - 2) Test Reports; Submit the following reports to Architect through construction manager from Testing Laboratory.
  - 3) Pre-test.
  - 4) Acceptance test.
- d. Certificates: Manufacturer's certificate certifying that components and Products meet or exceed specified requirements.
- e. Qualification Documentation:
  - 1) Submit documentation of manufacturer and installer experience indicating compliance with specified qualification requirements. Include lists of completed projects with project names and addresses, and names of Engineers and Contracting Officers.
  - 2) Fire protection contractor license issued by State or local authority having jurisdiction.
- f. Manufacturer's Field Reports: Submit the following reports to Architect through the construction manager from Manufacturer's Quality Control Inspector.
  - 1) Preparatory inspection.
  - 2) Initial inspection.
  - 3) Follow-up inspection.
  - 4) Final inspection.
- 4. Close out submittal shall include the following.
- 5. Project Record Documents: Accurately record the following.
  - a. Sprinklers and deviations of piping from Drawings.
  - b. Drain and test locations.
- 6. Operation and Maintenance Data:
  - a. Components of system, servicing requirements, inspection data, and location and replacement part numbers and availability, numbers of service depot.
- 7. Certification Letter:
  - a. Acknowledge system has been installed per the submitted drawings.
  - b. System has been inspected, trusted, approved by local authority and has been placed in to service.

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#### 1.06 GENERAL INSTALLATION REQUIREMENTS

- A. Sprinkler head layout shall be coordinated with ducting, lighting and plumbing, and structural drawings.
- B. Sprinkler piping shall be concealed above ceilings in finished areas and sprinkler head escutcheons shall match color of ceiling. Open beam lobby in building 4 and the mall glass canopy areas are considered finished areas for the purpose of this paragraph and pipes will be

concealed from public view in these locations as well. Piping in other unfinished tenant spaces w/o ceilings may be exposed and sprinkler heads shall be upright or pendant type as required, natural finish.

- C. In general, sprinkler piping shall be installed at maximum height throughout the building. Offset piping as required to clear mechanical ductwork, piping, building structure, etc. all pipe shall run parallel or perpendicular to building walls, unless otherwise directed by Architect.
- D. The piping installation shall be consistent with fire codes, relative to provisions for drainage and obstruction to spray pattern. Provide necessary deflectors so that sprinkler heads will not spray onto electrical equipment.
- E. Sprinkler heads located 7 feet-0 inches or less above finished floor elevation shall be provided with approved guards.
- F. If necessary, provide appropriate supporting members for piping, which shall be attached to the building structure so that the load imposed by the piping will not exceed the limitations of the structure.
- G. Sprinkler heads located near heat producing equipment shall conform to NFPA Section 13, relative to temperature ratings.
- H. Provide earthquake protection as may be required by NFPA 13.
- I. Anchor all underground mains, tees, ells, bends, valves, with concrete thrust blocks, bolted tie rods, tie rods and pipe clamps, or a combination of rods and thrust blocks, to resist the unbalanced thrust of water pressure of 200 psi or 50 psi above maximum static pressure, whichever is greater.
- J. Provide flexible couplings, sway bracing on hangers. Proper clearance around pipes passing through concrete construction, etc., to minimize forces on piping and prevent breakage.
- K. Provide flow switch on sprinkler main to elevator equipment room sprinkler heads and for sprinkler line to elevator shaft sprinkler head.
- L. Piping shall be pitched so the entire system can be drained. All drains and test connections shall be extended to the outdoors at the nearest exterior wall, and terminate above paved surfaces in approved locations. Run piping underground if necessary.
- M. Provide in suitable metal cabinets, to be located adjacent to sprinkler risers, the necessary number of extra heads together with wrenches of each type required - as recommended by NFPA.
- N. Provide guard posts to protect all post indicator valves, fire hydrants, siamese connections, etc., when these items occur within five feet of paved areas.
- O. Provide detector check with meter as required by local authorities.

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#### 1.07 GUARANTEE

- A. Contractor shall provide the Owner with a written guarantee that all material and equipment provided or installed under this Section shall be guaranteed for a period of one year from the date of completion.
- B. Should any trouble develop during this period due to defective materials or faulty workmanship, the Contractor shall furnish all necessary labor and material to correct the trouble without any cost to the Owner, any defective material or inferior workmanship noticed at the time of installation and/or during the guarantee period shall be corrected immediately to the entire satisfaction of the Owner and the Architect.

#### 1.08 FEES AND PERMITS

All fees and permits, etc., required for the Work of this Section shall be provided and paid for under this Contract.

## 1.09 COOPERATION

The Contractor shall cooperate fully with all other trades performing work in the same area, especially those performing work of related trades.

## 1.10 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. In addition to complying with pertinent codes and regulations of governmental agencies having jurisdiction, comply with;
  - 1. Recommendations of the Fire Rating Bureau having jurisdiction;
  - 2. Pertinent recommendations contained in NFPA Pamphlet No. 13, "Standards for Sprinkler System Installations."
  - 3. Requirements required by local Fire Prevention Bureau.

## PART 2 PRODUCTS

### SITE FIRE PROTECTION AND WET PIPE AUTOMATIC FIRE SPRINKLER SYSTEMS

#### 2.01 PIPE AND FITTINGS

- A. If allowed or required by local codes and authorities and Owner's insuring agent the sprinkler mains underground may be Class 200 unplasticized poly vinyl chloride (PVC) with integral bell and spigot joints. Piping shall meet the requirements of AWWA C900 and DR 14. Piping shall be Underwriters Laboratories listed and Factory Mutual approved. Fittings shall be cast iron for use with plastic pipe, shall conform to AWWA C110, ANSI A21.10 and Federal Specification WW-P-421 with bell modified to conform to pipe used and shall be cement lined.
- B. Wet sprinkler piping above grade shall be Schedule 40 black steel, Weight A, Class 1, Federal Specification WW-P-406D. Fittings shall be black cast iron, Type 1, Class A, Federal Specification WW-P-501E or vitaulic fittings and couplings Style 75 for cut groove pipe and fittings. American Standard couplings may be used if Contractor elects. 4 inches and larger pipe may be welded (ANSI B16.25) with welded fittings (ANSI B16.9). No welding of pipe shall be performed inside the building. All pipe to be welded shall be shop welded in such a manner that no hot-work is required to disassemble any part of the system once installed.

or

- C. If allowed by local codes and authorities and/or Owner's insuring agent, wet sprinkler piping above grade may be Schedule 10 (thin wall) with rolled groove (ASTM-A53-83). Vitaulic fittings and couplings Style 75. All piping fittings and couplings are to be UL listed and FM approved.
- D. Nonmetallic pipe underground shall have a bare copper wire not less than 0.01 inch in diameter continuous over its entire length.

#### 2.02 VALVES

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- A. Valves shall be UL approved, and located and installed in conformance with fire department and insurance company requirements, 175 psi design of the Crane Co., as specified below, or equivalent valves by Walworth, Kennedy, R.P. & C., Jenkins, Stockham, M & M, automatic sprinkler, Grinnell, and Viking or other manufacturers listed in FM approval guide.
- B. Control Valves - O.S. & Y iron body, bronze mounted Crane #467. All control valves shall be chained and locked in the open position; locks to be fitted with breakable shanks.
- C. Drain and test valves - angle or globe pattern type, screwed with brass body and trimmings and iron wheel handles. Crane #2 or AGF Model 100 "Testandrain".
- D. Check valve - iron body, bronze swing disc and hinge, Crane #375. 3-1/2 inches and smaller screwed, 4 inches and larger flanged.
- E. Standpipe hose valve - polished brass 2-1/2 inch globe valve for wet system shall be Potter-Roemer Inc., Fig. 4115, Standard Fire-West No. S217M or equal, with polished brass cap and chain. Provide recessed cabinet as called for on plans.
- F. Roof manifold - 2-way brass 6 inch by 2-1/2 inch by 2-1/2 inch 90 degree angle body, Potter-Roemer, Inc., Fig. 5877, Standard Fire-West No. S296, or equal with 2-1/2 inch hose valves as called out under Paragraph E, except valves and caps can be rough brass. Provide as required by local fire prevention bureau.

Note: FM - approved wafer design valves may be used subject to local approval.

### 2.03 ALARM CHECK VALVES

- A. Furnish and install an approved check valve with retarding chambers, gauges, relays, etc., to operate water motor gong upon flow of water through sprinkler system; valve to be UL approved. Valve shall be provided with an adjustable retarding chamber up to approximately 30 seconds. The retarding chamber shall be provided with an electrical alarm switch. Valve to be designed for 200 psi working water pressure.
- B. Automatic alarm bell with motor operator to ring alarm when water flows at alarm check valve. Provide water piping to water motor in accordance with code and manufacturer's recommendations.

### 2.04 POST INDICATING VALVES

Comparable to Mueller non-rising stem gate valve, with Model A-20800 adjustable indicator post, and an A-20816 extension section (verify length). Provide tamper switch on post. Provide as required by local Fire Prevention Bureau.

### 2.05 STANDPIPE SHUT OFF VALVES (AS REQUIRED)

Provide an O.S. & Y. shutoff valve at the base of each standpipe, locate in attic space. Each valve shall have a tamper switch to activate and sound an alarm if valve is closed.

### 2.06 SPRINKLER HEADS

Unless otherwise shown on drawings, or specified herein, sprinkler heads in acoustical lay-in or gypsum board ceilings shall be chrome plated flush pendant type, listed by Underwriters Laboratories.

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All heads in finished areas shall have ceiling color matched escutcheons. Heads in unfinished areas, mechanical, store rooms, janitor etc. shall be bronze pendant or upright type design. Heads shall have a 155 degree (bulb) temperature rating unless called out otherwise on drawings or temperature rating as required by local Fire Prevention Bureau.

## 2.07 ALARMS

- A. Water Motor Alarm: Alarm of the approved weatherproof and guard to sound locally on the flow of water in each sprinkler system to which it is connected shall be mounted on the outside at a location approved by Architect.
- B. Flow Switch: Switch circuit for the automatic transmittal of an alarm to the central control and monitoring system shall be provided and arranged to be actuated by the flow of water in each system.

## 2.08 CABINET

- A. A cabinet containing spare sprinkler heads and equipment of the following type and number shall be furnished and installed on the wall at the main supply valve in an accessible location.
  - 1. Six heads for each 300 heads or fraction of for each type and size used in the building.
  - 2. One sprinkler wrench for each size and type of head.
  - 3. One pair of sprinkler tongs.
- B. The cabinet shall be distinctly labeled, designating the type and quantity of sprinkler equipment it contains.

## 2.09 FIRE DEPARTMENT CONNECTION

- A. Fire department connection shall be comparable to Potter-Roemer Inc., No. 5705 or 5745, two-way or three-way single clapper-ductile iron body, angle threaded outlet, as called out on plans. Red enamel finish, lettered "Auto. Spkr." brass swing clapper and pin lug swivels. Size 4 inches by 2-1/2 inches by 2-1/2 inches.
- B. Plugs shall be 5940 2-1/2 inch brass pin lug plug with chain on each inlet connection.
- C. Riser to be 4 inch galvanized steel pipe threaded to fit inlet connection above. Paint red and provide 4 inch check valve underground between inlet connection and sprinkler main.

## PART 3 INSTALLATION

### 3.01 INSTALLATION

- A. Installation, workmanship, fabrication, assembly, erection, examination, inspection, and testing shall be in accordance with NFPA 13, except as modified herein. Install piping straight and true to bear evenly on hangers and supports. Keep the interior and ends of new piping and existing piping affected by Contractor's operations thoroughly cleaned of water and foreign matter. Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter. Inspect piping before placing into position.

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- B. Provide electrical work associated with this Section under Section 16721, "Fire Alarm System" and NFPA 70. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- C. Disinfect the new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Exercise caution when mixing chlorine disinfectant solutions. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with clean water until maximum residual chlorine content is not greater than 0.2 part per million or residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit results prior to new water piping being placed into service. Disinfection of systems supplied by non potable water is not required.
- D. For underground pipe exterior of building, provide tape buried with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.
- E. For all exposed fire sprinkler systems, clean, pretreat, prime, and paint new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one coat of pretreatment primer applied to a minimum dry film thickness of 0.3 mil, and one coat of zinc chromate primer applied to a minimum dry film thickness of 1.0 mil. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primer surfaces with the following:
1. Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil. Provide piping with 2-inch wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20-foot intervals throughout the piping systems.
- F. Firestopping Penetrations in Fire-Rated Wall/Floor Assemblies: Contractors shall provide proper sizing when providing sleeves or core-drilled holes to accommodate their through penetrating items. All voids between sleeve or core-drilled hole and pipe passing through, shall be firestopped to meet the requirements of ASTM E-814, in accordance with Section 07270, "Firestopping".
- G. Perform test to determine compliance with the specified requirements in the presence of the Engineer.
- H. Hydrostatically test each system at 200 psig for a 2-hour period with no leakage or reduction in pressure. Flush piping with potable water in accordance with NFPA 13. Piping above suspended ceilings shall be tested, inspected, and approved before installation of ceilings. Test the alarms and other devices. Test the water flow alarms by flowing water through the inspector's test connection. When tests have been completed and corrections made, submit a signed and dated certificate, similar to that specified in NFPA 13, to the Engineer.
- I. Contractor shall provide and install, at all valves and controls, engraved plates with sufficient information for occupant use. At minimum, these plates shall explain the uses of the manual controls, the types of alarms expected, automatic responses and discretionary responses.
1. Labels shall be of red-over-white plastic engraved through the red so as to provide white lettering in red background.
  2. Lettering to be no smaller than 1/4 inches wide, 1/4 inches high, in any event, the lettering plates for horns, bells, and manual controls to be readable from a distance of 20 feet or more.

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**END OF SECTION**

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