

SECTION 21 13 00

FIRE SUPPRESSION SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide a complete fire protection system as indicated on the Drawings and as specified herein consisting of the following but not limited thereto.
1. Complete fire sprinkler systems including connections to existing systems, fire department connections, sprinkler heads, control valves, flow and tamper alarms, all required accessories, etc.
 2. Sleeve, hangers and supports.
 3. Apply for, obtain and pay for all permits certificates, inspections and approvals required in connection with all Fire Protection Work.
 4. Shop drawings, samples and instructional manuals, tests and adjustments. Shop drawings shall be prepared in a manner that will allow use as filing drawings to replace the drawings prepared and filed by the design engineer. Project will be phased; Contractor shall anticipate that multiple filings may be required to allow permitting and approval of the project in a phased manner.
 5. All interlocking control wiring and conduit.
 6. Color coding and stenciling of all piping systems.
 7. Cutting and rough and finish patching.
 8. Prime and finish painting of all pipe risers and mains.
 9. Provide hydraulic calculations and drawings signed and sealed by a licensed professional engineer all as required by applicable Building Code, Referenced Standards, and N.F.P.A. Code. Contractor shall replace Engineer as Engineer of Record.
 10. Provide ladders to all valves more than 8'-0" above finished floor.
 11. Tests for all systems provided under this Section of the Specifications.
 12. Where due to Union regulations or trade agreements, any of the work shown on the Drawings or specified herein is not considered Fire Protection Contractor's Work, this Contractor shall sub-contract the work in question, but this Contractor shall be held responsible for the complete installation.
 13. It is not the intention of these Specifications to describe, nor the Contract Drawings to show in detail, all the various pieces of apparatus and appurtenances and their connections. This Contractor shall, as part of the Contract, furnish and install all incidentals, such as piping, fittings, valves, etc., required to complete the installation of the equipment. This Contractor shall refer to Architectural Drawings and Fire Protection Drawings for exact location of devices including type and quantities. This Contractor shall be responsible for providing and connecting all fixtures and equipment.
 14. All work described in these Specifications and not shown on the Drawings, or vice versa, shall be installed in a manner similar to the work shown or described.
 15. Sprinkler drawings shall be reviewed and approved by insurance underwriters prior to installation.
 16. Approvals of cross-connection control devices for main water services. Prepare and submit to the Engineer, all drawings, applications, test reports, correspondence, etc., as required in connection with the approval and installation of the backflow preventors and/or double check valves, as indicated on the Drawings or as required by the New York State Department of Health. File all applications after approval by the Engineer. The Engineer will act as Engineer of Record and will sign and seal all applications as required.

- B. It is the intent of this Specification for the Contractor to provide complete hydraulically designed wet pipe sprinkler systems for the areas indicated in these Specifications and shown on the Contract Drawings. This Contractor shall be the Engineer of record for the fire sprinkler system. Furnish all design, material, and labor to complete the contract within the intent of these Specifications and Contract Drawings even though each and every item necessary is not specifically mentioned or shown.

1.2 QUALITY ASSURANCE

- A. Contractor Qualifications: Work shall be performed by a Contractor regularly engaged in the design and installation of fire protection systems in accordance with NFPA requirements and having at least three years continuous experience in this type of work. Experience shall include projects of similar type, size and complexity.
- B. Design Criteria: Provide fire protection systems of types, pressure, flow and densities required by regulatory agencies having jurisdiction.
 - 1. Systems shall be calculated in a manner acceptable to regulatory agencies.
 - 2. Contractor shall complete a hydrant test to confirm static and residual pressure for use in the hydraulic calculation. Contractor shall not assume that a prior hydrant test has been completed unless the test data is presented on the drawings.
 - 3. Provide the following sprinkler head densities: 0.10 GPM/SQFT – Light Hazard
 - 4. Occupancy classification: Light hazard.
 - 5. Maximum sprinkler head spacing – based on NFPA Code: Light hazard- 225 sq.ft./sp.hd.
 - 6. Calculations shall be based upon 1500 sq.ft. of the hydraulically most remote area of sprinkler operation for each system unless increased by dry systems or sloped ceiling. (30% increase for each condition).
 - 7. Where source pressure allows, systems shall be sized for a minimum safety margin of 7 psi. This margin is in addition to the 7 psi minimum required at each head.
- C. Pipe sizes shown on drawings may be larger than minimum required. This is to accommodate additional partitioning which may occur in the future. Do not reduce sizes.
- D. Requirements of Regulatory Agencies: Total system shall be acceptable upon completion and testing to the following:
 - 1. Jurisdictional Code Enforcement Agencies
 - 2. Jurisdictional Insurance Agency or Underwriter
 - 3. Confirm requirements of the authority having jurisdiction and Owner's Insurance Underwriter prior to bid.
- E. The Contractor shall give necessary notices, file drawings and specifications with the department having jurisdiction, obtain permits or licenses necessary to carry out this work and pay all fees therefore.
- F. Certificate of Installation: Submit certificate upon completion of fire protection work, stating that the work has been completed and tested in accordance with the specified standards, that there are no defects in the system and it is operational.
- G. To assure uniformity and compatibility of piping components in grooved piping systems, all grooved products utilized shall be supplied by a single manufacturer. Grooving tools shall be supplied from the same manufacturer as the grooved components.

1.3 CODES AND STANDARDS

- A. In addition to those specified in Section 21 05 00, comply with local fire department regulations and with the following:
 - 1. Local Water Department
 - 2. New York City Building Code
 - 3. Factory Mutual Engineering Division (FM)
 - 4. Local Health Department
 - 5. New York City Department of Buildings
 - 6. NFPA 13, 14, 24, 231C
 - 7. Local modifications to the Fire Codes
 - 8. UL 1008 Automatic Transfer Switches
 - 9. UL 508 Industrial Control Equipment
 - 10. NFPA 70 National Electrical Code
- B. All materials and equipment used in the installation of the fire protection system shall be as approved in the Underwriters' Laboratories list of inspected fire protection equipment and materials, or the Factory Mutual Laboratories list of approved equipment and fire protection devices involving fire hazard, and shall be the latest product of the manufacturer, and shall bear their label.

1.4 SUBMITTALS

- A. Submittal data shall be in accordance with Division 1 and the following shall be submitted for review to the Architect prior to the start of installation:
 - 1. Material and equipment information shall include catalog cuts and technical data for each system component or device. This shall include, but not be limited to piping, fittings, globe and angle valves, O.S.&Y valves, butterfly valves, check valves, automatic sprinkler heads, escutcheons, hangers, flow switches, tamper switches, dry pipe valves.
- B. Prepare shop drawings showing layout of fire protection system. Use minimum scale of 1/8" = 1'-0" for floor plans. Drawings shall reckon with all building components and show routing of piping to clear same. Drawings shall be accurately dimensioned to show proposed location of all fire protection system components. System design shall be completely coordinated with the architectural, structural, mechanical, and electrical features of the building. The drawings shall show all details required by NFPA 13. In all areas with suspended ceilings, reflected ceiling plans shall be prepared showing the location of sprinklers, lights, diffusers, grilles, etc. Drawings shall be suitable for filing with DOB, FM and FDNY. Contractor and Contractor's Engineer shall complete these filings with DOB and FM.
- C. Submit a complete schedule of the material and equipment proposed for this installation to the Architect/Engineer for approval. Include catalog cuts, diagrams, drawings, and such other descriptive data as may be required to clearly show what is intended to be installed and how. In the event any items of material or equipment contained in the schedule fail to comply with the specifications, such items may be rejected.

- D. Submit to the engineer five (5) sets of blueprints and hydraulic calculations signed and sealed by a Professional Engineer retained by the contractor. After approval by the engineer, submit three (3) copies of the drawings and hydraulic calculations of the sprinkler system to the regulatory agencies having jurisdiction. Update the drawings to reflect any comments and resubmit the drawings until approval is obtained. Upon receipt of approval submit the drawings and hydraulic calculations to the Architect for record. Approval of the Architect must be obtained before purchasing or installing any equipment. Submissions shall be signed and sealed by an engineer retained by the fire protection contractor.
- E. Approval of submittals will not relieve the Contractor of the responsibility for correcting any errors which may exist or for meeting requirements of the specifications. No partial submittals will be accepted.
- F. A set of approved installation drawings shall be kept at the job site and marked to indicate all installation conditions which are different from the approved drawings.
- G. In the event that the contractors final design deviates from the bid documents and a refiling is required, the contractor shall prepare all documents required for the refiling and provide adequate copies signed and sealed by an engineer retained by the contractor. Contractor shall also execute any documents required to replace Engineer as Engineer of record if Engineer has previously served as Engineer of Record.
- H. Grooved joint couplings and fittings shall be shown on shop drawings and product submittals and shall be specifically identified with the applicable manufacturer style or series number.
- I. Sprinklers shall be referred to on drawings, submittals and other documentation, by the sprinkler identification (SIN) or Model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.
- J. Manufacturer's Data: Submit manufacturer's product data for fire protection valves including:
 - 1. Dimensions
 - 2. Sizes
 - 3. End Connections
 - 4. Weights
 - 5. Installation instructions
 - 6. Instructions on repacking and repairing valves.
 - 7. Range of flow for balancing valves and plug valves.
- K. Valve Tag List: Refer to Section 22 05 53 of the Specifications.

1.5 GREEN BUILDING REQUIREMENTS AND PERFORMANCE CRITERIA

- A. Green Building Performance Criteria:
 - 1. All field-applied concrete admixtures, adhesives, sealants, paints and coatings used for interior applications shall meet the volatile organic compound (VOC) and chemical component limitations as defined by national standards.

1.6 DESIGN REQUIREMENTS

- A. Engineer's bid documents are provided to define the scope of the sprinkler work and the general arrangement of systems. It shall be the Contractor's responsibility to size the sprinkler system pipes in accordance with the requirements of NFPA. Contractor shall submit all calculations to the Engineer for review at time of drawing submittal. Submittal of these calculations to the Engineer will in no way relieve the Contractor of his responsibilities for complete and proper design of the fire protection system. Upon preliminary approval by the Engineer, the Contractor shall prepare a complete set of filing documents for submission to DOB and FM. Filing sets shall be developed in phases as required to allow partial filings and approvals in support of the phasing plan developed for the project. All filings shall include plan drawings suitable for DOB filing and hydraulic calculations as required to support proposed pipe and pump configuration and sizing.
- B. The Contractor shall fully inform himself regarding any special characteristics and limitations of the space available for the installation of all materials under Fire Protection Work.
- C. The contractor shall ascertain that all his equipment, such as pumps, valves, flow switches and such other apparatus as may be necessary to be reached from time to time for operation and maintenance is made easily accessible for operation and maintenance.
- D. The location of equipment on the Fire Protection Drawings may conflict with the building construction and may disclose the fact that the location of this work does not make its position easily and quickly accessible. The contractor shall call the Architects attention to this fact before installing this work, and shall be guided by their instructions.
- E. The contractor shall prepare calculations in accordance with N.F.P.A., Chapter 13, Insurance Carrier Specifications and requirements herein indicated. Calculations shall be prepared for as many areas of application as necessary to demonstrate to the satisfaction of the Insurance Carrier, Building Department and Architect that the system meets the herein outlined criteria.
- F. It shall be the Contractor's responsibility to design the system so that no interferences exist between the fire protection system and work of other trades, equipment and systems designed and installed by others. The latest issues of all architectural, structural, mechanical and electrical drawings shall be reviewed to assist the Contractor in preparing the design so as to avoid interference.
- G. This Contractor shall provide all necessary control wiring and equipment necessary for an operational system. This includes, but not limited to, key switches, releasing panels, solenoid valves, etc.
- H. Any fees charged by FDNY for false alarms associated with construction activities will be the responsibility of the Contractor.
- I. The Drawings are diagrammatic and indicate the general arrangement and location of equipment, piping, fixtures, etc. Make modifications in the layout work that may be required to suit actual job conditions without extra compensation.
- J. Sprinkler head locations on the bid documents are diagrammatic, contractor shall provide additional heads and branches at no additional cost, for a code compliant system.
- K. The Drawings and Specifications are intended to cooperate. Any materials, equipment, or systems related to this Section and exhibited on the Architectural and Fire Protection Drawings but not mentioned in the Specifications are to be executed to the intent and meaning thereof, as if it were both mentioned in the Specifications and set forth on the Drawings.

- L. Drawings and Specifications are intended to be fully cooperative and to agree, but should any discrepancy or apparent difference occur between Drawings and Specifications or should occur in the work of others affecting the work, the Contractor shall notify the Architect immediately. If the Contractor proceeds with the Work affected without instructions from the Architect, he shall make good any resultant damage or defect. All misunderstandings of Drawings and Specifications shall be clarified by the Architect.

1.7 EXAMINATION AND COORDINATION

- A. The Drawings are diagrammatic and indicate the general arrangement of systems and work indicated under this Section. (Do not scale the Drawings). The Contractor shall consult the Architectural Drawings and Details for exact locations of fixtures, and equipment; where same are not definitely located, he shall obtain this information from the Architect.
- B. The Contractor shall follow the Drawings in laying out work and check Drawings of other trades to verify spaces in which work will be installed and maintain maximum headroom and space conditions at all points. Where headroom or space conditions appear inadequate, the Architect shall be notified in writing. The installation shall not proceed before receiving the Architect's written instructions.
- C. If directed by the Architect, the Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades, maintain required headroom and space conditions, and for proper execution of the work.
- D. Where variances occur between the Drawings and the Specifications, or within either document itself, the item or arrangement of better quality, greater quantity, or higher cost shall be included in the Contract. Architect will decide on the item and manner in which the Work shall be installed and his decision shall be final.
- E. It shall be the responsibility of the Contractor to closely schedule his work so that his work will be installed at the proper time and without delaying the completion of the entire Project.
- F. Where the Fire Protection Work will be installed in close proximity to the Work of other trades, or where there is evidence that the Work of the Contractor will interfere with the Work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. The Contractor shall work with all trades to prepare composite working drawings and sections at a suitable scale not less than $3/8" = 1'-0"$ clearly showing how his work is to be installed in relation to the Work of other trades. If the Contractor installs his Work before coordination with other trades or so as to cause interference with Work of other trades, he shall make necessary changes in his Work to correct the condition without extra charge.
- G. Study the Drawings and Specifications in order to insure completeness of the Work required under this Section. Supplementary items normal and necessary to complete the Work, though not definitely shown or specified shall be included.
- H. Verify all measurements and conditions in the field before starting work.
- I. Examine all surfaces to which Work under this Section is to be applied and notify the Architect in writing if any conditions exist which are detrimental to the proper and expeditious installation of Work. Starting of Work shall be construed as acceptance of surfaces.

- J. If it should be necessary to remove and relocate any material or equipment that has been installed without proper investigation and coordination with the work of other Sections, such materials or equipment shall be removed and relocated without additional cost to the Owner.

1.8 WATER SUPPLY

- A. The water supply, as shown on the drawings, will be installed by other divisions of the work, who will provide a flange connection inside the building for the fire protection system. The fire protection Contractor shall make the required connection at this point for the fire protection system.

1.9 WARRANTIES

- A. The entire new system shall be warranted to be free from defects for a period of one (1) year from the date of Notice of Acceptance.

1.10 PROJECT RECORD DOCUMENTS

- A. Upon completion of the work, the Contractor shall revise all fire protection drawings to agree with the construction as actually accomplished and stamp "As-Built". Those drawings where no change is involved shall be likewise stamped. These "As-Built" drawings shall show the fire protection system as it existed at the completion of the contract work.
- B. See Division 1 for additional requirements.

1.11 CLEANING, PROTECTION AND ADJUSTING

- A. The Contractor shall be responsible for the protection of all fire protection of all fire protection systems equipment against breakage or damage at all times until final acceptance of the job
- B. All openings left in floor for passage of supply pipes shall be covered and protected. Due precautions shall be taken against freezing during cold weather. All pipes shall be protected with suitable coverings as soon as set. All open ends of pipes shall be closed by a plug fitting to prevent obstruction and damage.
- C. The Contractor shall frequently clean up and remove from the Site all rubbish, scrap materials and debris caused by his Work, and upon completion of the Work and before final payment is made, he shall remove from the site all surplus material, temporary structures, tools and all debris resulting from his operation.

1.12 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the General Conditions of the Contract and Supplementary General Conditions and Division 1 - General Requirements, apply to work of this Section. This Contractor shall comply with all applicable sections of Divisions 21 through 23.

PART 2 - PRODUCTS**2.1 PIPE AND FITTINGS**

- A. Pipe joints above ground shall be screwed, flanged, welded, or mechanical joints. Welded joints are not acceptable in pipe less than 2" in diameter. No welding permitted except with certified welders in shop.
- B. Piping above ground for threaded joints shall be Schedule 40 black steel pipe. Schedule 10 (Thin wall) piping is not permitted.
- C. Screwed fittings above ground shall be gray cast iron suitable for 175 psi cold water working pressure and so rated. Provide valves with an elevated pressure rating for work in buildings more than 350 feet tall.
- D. In lieu of weld, screwed, or flanged connections, mechanical type couplings and fittings as manufactured by Victaulic, Gustin Bacon, or approved equal, may be used in piping above grade.
 - 1. Grooved end fittings shall be UL/FM approved, full flow, short radius ductile iron conforming to ASTM A536, or carbon steel conforming to ASTM A53 with factory grooved ends designed to accept mechanical couplings.
 - 2. Grooved mechanical couplings shall be UL/FM approved, consisting of two ASTM A536 ductile iron housings, a pressure-responsive, synthetic rubber gasket, and plated steel bolts and nuts.
 - a. Rigid Type: Housings shall be cast with offsetting, angle-pattern bolt pads to provide system rigidity and support and hanging in accordance with ASME B31.1 and B31.9
 - 1) 1-1/4" through 4": "Installation Ready" stab-on design, for direct 'stab' installation onto grooved end pipe without prior field disassembly and no loose parts. Victaulic FireLock EZ Style 009.
 - 2) 5" and larger: Standard rigid couplings. Victaulic FireLock Style 005 or Style 07 Zero-Flex.
 - b. Flexible Type: Use in seismic areas where required by NFPA 13.
 - 1) 2" through 8": "Installation Ready" stab-on design, for direct 'stab' installation onto grooved end pipe without prior field disassembly and no loose parts. Victaulic Style 177 QuickVic.
 - 2) 10" and larger: Standard flexible couplings. Victaulic Style 77.
 - 3. Coupling gaskets shall be listed for use as follows:

Fire Protection Service	Temperature Range	Gasket Recommendation
Water/Wet Systems	Ambient	C-Shape or EZ Style 009 design, Grade EPDM, Type A

- 4. Flange adapters shall be ASTM A536 ductile iron, flat faced, designed for incorporating flanges with ANSI Class 125 or 150 bolt-hole patterns to a grooved piping system. Victaulic Style 741 or 744.
- E. Provide escutcheons on penetrations of interior walls.

2.2 BUTTERFLY VALVES

- A. Butterfly valves shall be furnished with worm gear type indicating operator to assure slow closing. Valves shall have a completely sealed shaft, integral flange seals, and hex drive.
- B. Grooved end butterfly valves shall be furnished with a weather-proof actuator with pre-wired supervisory switches. Ductile iron body, nickel-plated ductile iron disc, Type 416 stainless steel two-piece stem and Nitrile seat, up to 365 psi CWP rating.
 - 1. Supervised in the open position: Victaulic Series 765 or Series 705
 - 2. Supervised in the closed position for fire pump metering test lines and rooftop test units: Victaulic Series 766 or Series 707C
- C. Approved manufacturers are Victaulic, Keystone, Stockham and Kennedy.

2.3 O.S.&Y. VALVES

- A. Outside stem and yoke gate valves shall be of the wedge disc type, shall permit straight line flow and complete shut-off, and shall be so designed that the valves can be packed under pressure when wide open. Valve shall be iron body, bronze trim, flanged or screwed ends, with rising stem and rated 175 psi non-shock cold water service. Provide valves with an elevated pressure rating for work in buildings more than 350 feet tall.
- B. Outside stem and yoke gate valves shall be of the bronze mounted, resilient wedge type, grooved ends or grooved by flanged ends, ductile iron body, cast iron bonnet and disc with EPDM disc coating, and brass stem, 250 psi maximum pressure rating. Victaulic FireLock Series 771.
- C. Approved manufacturers are Victaulic, Keystone, Stockham and Kennedy.

2.4 CHECK VALVES

- A. All swing check valves shall be 175 psi non-shock cold water service, iron body, bronzed trim, horizontal swing with renewable bronze seat and rings. All check valves two (2) inches and smaller shall be bronze, screwed, horizontal swing type. All check valves two and one half (2½) inches and larger shall be flanged or grooved type. Provide automatic ball drip where valve is subject to freezing.
- B. All water check valves shall be 175 psi working pressure, iron body with spring actuated double bronze plate and rubber seat.
- C. Provide valves with an elevated pressure rating for work in buildings more than 350 feet tall.
- D. Grooved end check valves shall have a pressure rating up to 365 psi CWP, ductile iron body, stainless steel or EPDM coated ductile iron disc, stainless steel spring, nickel-plated or welded-in nickel seat.
 - 1. 2" through 3": Victaulic FireLock Series 717H and 717HR (365 psi CWP).
 - 2. 4" through 12": Victaulic FireLock Series 717 and 717R (300 psi CWP).
- E. Approved manufacturers are Victaulic, Keystone, Stockham and Kennedy.

2.5 GLOBE AND ANGLE VALVES

- A. Valves shall be furnished with renewable disc, non-shock, and shall back seat in the fully opened position to allow repacking under full pressure without removing the valve from the line. Valve shall be rated for 175 psi working pressure.

- B. Provide valves with an elevated pressure rating for work in buildings more than 350 feet tall.

2.6 VALVE SUPERVISORY SWITCHES

- A. All valves which control water to automatic sprinkler heads shall be equipped with supervisory switches having one normally open contact and one normally closed contact.
- B. Provide tamper switches on all valves in the fire line.
- C. Switch shall be approved for use on the type of valve to be monitored.

2.7 FLOW SWITCHES

- A. All flow switches shall be field adjustable vane type with pneumatic retard and 175 psi working pressure. Units shall be suitable for installation by drilling pipe and securing with U-bolt furnished with the switch. Units shall be single pole double throw, suitable for 24 volt D.C. service with one normally open contact and one normally closed contact. Waterflow switches shall be adjusted so that the device will transmit a waterflow alarm within 30 seconds of opening the inspector's test valve on the sprinkler system. Switches shall be ACME 430 or approved equal.

2.8 AUTOMATIC FIRE SPRINKLER HEADS

- A. Approved manufacturers are Viking, Reliable, Victaulic.
- B. Sprinkler heads shall have a temperature rating of 165°F except for heads in areas of high temperature and in close proximity to heat sources which shall be temperature rated in accordance with NFPA 13.
- C. Sprinkler heads in ceilings to be concealed pendant.
- D. Supply Owner an extra stock of six sprinklers minimum, three of each type, and any special required sprinkler wrench. Heads shall be packed in a suitable container for wall mounting. Provide additional heads that may be required by NFPA 13.
- E. Sprinkler heads shall be Underwriters' Laboratories approved cast brass quick response wet type with 1/2" discharge orifice where scheduled as K-Factor 5.6 and 17/32" discharge orifice where scheduled as K-Factor 8.0. Sprinkler heads with reduced orifice will be considered where approved by code and required to address a limited water supply condition.
- F. Any and all sprinkler heads placed in location where they are liable to be accidentally hit in the normal course of events shall be provided with heavy wire guards. Guards shall be listed, supplied, and approved for use with the sprinkler, by the sprinkler manufacturer.
- G. The sprinkler heads in all areas are to be installed on a true axis line in both directions with a tolerance of $\pm 1/2"$. At the completion of the installation, if any heads are found to exceed the above, any adjoining work that may be disturbed in reinstating said heads shall be repaired or reinstated at no additional cost to the Owner. All heads installed in hung ceilings shall be located on the centerlines of tiles.
- H. Sprinkler heads shall be as manufactured by Victaulic Company, Viking, Reliable Sprinkler Corp., or Grinnell, and shall be as follows:

Area	Head	Reliable Model #	Victaulic Model #
Finished spaces and corridors	Fully recessed, concealed type. Off white painted cover.	F4FR	V38
Unfinished spaces and corridors	Standard upright/sidewall head, brass finish	F1FR	V27
Mechanical Rooms, storage, room without finished ceilings	Standard upright/sidewall head, brass finish with wire guard.	F1FR	V27
Loading docks, areas exposed to freezing, head extended into attic or unheated cavity	Dry head, length shall be determined by space conditions.	F3QR	V36
Mechanical rooms, storage room with finished ceilings	Standard semi recessed pendant head.	F1FR	V27
Community Room and Staff Area	Recessed Horizontal Sidewall Sprinkler	G/F1/HSW1	-

2.9 FIRE DEPARTMENT CONNECTION

- A. Approved manufacturers are Potter-Roemer, or equal.
- B. Fire department connection shall be 2-way projecting standpipe inlet with self-closing clapper valves and pin lug swivels and caps with chains equal to Potter-Roemer Series 5720 and Potter-Roemer escutcheon plate Series 5960 with appropriate lettering. Furnish with type of thread as directed by the local fire department and of size shown on the drawings.
- C. Provide $\frac{3}{4}$ " automatic ball drip with drain piping to nearest floor or area drain.
- D. Fire Department connection shall be painted to meet local requirements.

2.10 INSPECTOR'S TEST AND DRAIN CONNECTION ASSEMBLY

- A. Victaulic Co. No. 720 TestMaster II or approved equal.

2.11 ALARM FACILITIES

- A. Equipment necessary to accomplish a transmitted waterflow signal and auxiliary contacts shall be provided. Main shut-off valves shall be electrically supervised. Any tamper-proof switches required for testing the sprinkler system shall be furnished. Alarm devices shall be as manufactured by Potter Electric Signal Company or approved equal.
 - 1. Transmitted Alarm: A transmitted alarm shall be provided for the transmission of tamper and waterflow signals to the main fire alarm control panel. Wiring shall be provided in Division 26.

2.12 TEST AND STATUS CONNECTIONS

- A. Furnish and install test connection for fire protection system and pipe to appropriate drains.

2.13 MISCELLANEOUS

- A. Nameplate data information: The nameplates shall be installed on each main riser and shall include the following design data: building designation, location of remote area, design density, area of application, and system demand (GPM and PSIG at base of riser).
- B. Control valve signs: The Contractor shall provide a description sign, minimum dimensions seven (7) inches by nine (9) inches, for every valve in the system which controls water to sprinkler heads. Signs shall be single faced, white letters on a red background, with a space designating who to notify if valve needs to be closed. Signs shall be fastened to each valve with lightweight chain.
- C. Miscellaneous signs: Signs for alarm test valves, main drains, auxiliary drains, etc. shall have minimum dimensions of two (2) inches by six (6) inches. Signs shall be single faced, white letters on a red background. Each sign shall be fastened to each valve with lightweight chain.
- D. Provide (2) 11 x 17 copies of approved system diagram. One shall be mounted in a glazed frame as directed by Architect.
- E. Provide a sign at the base of each riser describing the design criteria of the system.

2.14 PIPE HANGERS

- A. Provide products which are Underwriters Laboratories listed.
- B. Provide pipe hangers and supports of which materials, design, and manufacture comply with ANSI/MSS SP-58, MSS SP-69, MSS SP-89.
- C. Assume the responsibility for the proper transfer of the loads of the piping system to the structure. No additional cost to the Owner should be expected for any corrective work during construction.
- D. Supports and hangers shall be provided for all horizontal and vertical piping. The hanger design shall conform to the ASA Code for Pressure Piping.
- E. All bracket clamps and rod sizes indicated in these Specifications are minimum size only. This Contractor shall be responsible for structural integrity of all supports. All structural hanging material shall have a safety factor of five (5) built in.
- F. All pipe supports shall be of type and arrangements as hereinafter specified. They shall be so arranged as to prevent excessive deflection and avoid excessive bending stresses between supports.
- G. All auxiliary steel for pipe supports shall be furnished and installed by the Contractor, where overhead construction does not permit fastening of hanger rods in required locations.
- H. Pipe supports shall be of the following type and figure number as manufactured by Grinnell. Equal materials manufactured by Fee & Mason Carpenter & Patterson may be submitted for approval.

Pipe Hanger Schedule:

<u>Item</u>	<u>Grinnell Fig. #</u>	<u>Piping Sizes</u>
Beam Clamp	61	All
Beam Clamp w/Retaining Clip	87	All

Clevis Hanger	260	8" and Smaller
Pipe Saddle	264	4" and Larger
	192	2, 2-1/2", 3"
Riser Clamp	261	All
Stand Off Pipe Clamp	103	All
Brackets	195, 199	All
Steel Washer Plates	60	All
Concrete Insert	CB 282	All

- I. Pipe Supports in Pipe Chases: Supports shall securely hold piping prevent vibration, etc. Provide pipe supports and channels as required. Use Grade KJA Cyclac DH self-extinguishing ABS as manufactured by the Sumner Corporation or approved equal. Tie wire shall not be used.
- J. In grooved piping systems, Victaulic Style 009, 005, and 07 rigid couplings may be used with IPS steel piping systems, which meet the support and hanging requirements of NFPA 13. An adequate number of Victaulic Style 177, 75 and 77 flexible couplings shall also be used to compensate for thermal expansion/contraction of the pipe.

PART 3 – EXECUTION

3.1 PREPARATION

- A. The Contractor shall investigate the conditions affecting the work and shall arrange his work accordingly, providing such fittings, valves, and accessories as may be required to meet such conditions. The Contractor shall field verify all dimensions and conditions governing his work at the building. Materials shall not be fabricated or delivered to the site before the approved submittals have been received by the Contractor.

3.2 GENERAL INSTALLATION

- A. Investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings, valves, and accessories as may be required to meet such conditions. The Contractor shall field verify all dimensions and conditions governing his work at the building. Materials shall not be fabricated or delivered to the site before the approved shop drawings and equipment submittals have been received by the Contractor.
- B. Entire installation shall be in accordance with approved shop drawings. When unforeseen job site conditions will not permit piping to be installed as shown on the drawings, necessary changes will be made to accomplish a coordinated system without additional cost to the Owner, even though pipe may have been delivered to the site cut to predetermined lengths.
- C. Provide gate valves of size and at locations shown on the drawings and any additional valves required by local authorities. Locate all valves where readily accessible. Provide chain wheel operators or permanent ladders for all valves not accessible from the floor. All main line valves shall be electrically monitored and secured with a chain and padlock which will lock the valve in an open position.

- D. Provide check valves of size and at location shown on the drawings and any additional check valves that might be required by local authorities.
- E. Provide valved test drains as required by NFPA. Pipe test drains to spill to nearest floor drain, or receptor.
- F. Make provisions to drain all parts of the piping system.
- G. The hydraulic calculations shall be performed in accordance with the requirements of NFPA 13 and 14. The Contractor shall calculate the demand point for the system so that it remains ten (10) percent below the final water supply curve at the connection to the public water system. The demand point for the systems shall include an allowance for the inside and outside hose demand. The basis for the hydraulic calculations shall be determined by a waterflow test performed by the Contractor and acceptable to the Authority Having Jurisdiction.

3.3 PIPING INSTALLATION

- A. Perform the work in a professional workmanlike manner, according to the best practices of the trade. All sprinkler piping must be substantially supported from the building structure and only approved type hangers shall be used. Sprinkler piping in all areas shall be concealed unless otherwise noted on the contract drawings. In those noted locations and in areas with no ceiling, piping shall be installed as high as possible using necessary fittings and auxiliary drains to maintain maximum height. Any deviations found necessary shall be immediately brought to the attention of the Architect. All piping discharging outside (main drains, inspectors test pipes) shall do so on paved surfaces or on splash blocks.
- B. All inside piping shall be joined by means of screwed, flanged, flexible gasketed joints, or other approved method. Risers, feed mains, cross mains, and branch lines may be shop welded using approved welding fittings. Welding and brazing shall conform to the standards as set forth in NFPA#13. Welding and torch cutting shall not be permitted as a means of installing or repairing sprinkler system piping on-site.
- C. Chrome-plated escutcheons shall be provided where exposed piping passes through finished floors, walls, partitions, and ceilings. Secure plates to pipe with set screws or spring clips.
- D. It is the intent that each part of the Fire Protection Systems shall be complete in all details and all lines provided with all control valves as indicated on Drawings, or as may be required for the proper control of the pipe lines under this Section so that any fixture, line or piece of apparatus may be cut out for repair without interference or interruption of the service to the rest of the building.
- E. Run piping straight and as direct as possible. In general, form right angles with or parallel to walls or other piping. Risers shall be erected plumb and true.
- F. After cutting, all pipes shall be reamed out to full bore and before erection the inside of all pipes shall be thoroughly cleaned.
- G. No piping or work shall be concealed or insulated until all required tests have been satisfactorily completed and work has been approved by the Architect and all other authorities having jurisdiction.
- H. Where complete concealment is impossible because of obstructions such as beams, ducts, lights, piping, etc., the Contractor shall not install any work before first consulting with the Architect and his instructions (written or revised Drawings) shall be followed.

- I. Provide necessary structural members, hangers and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations. In all cases where hangers, brackets, etc., are supported from concrete construction, care shall be taken not to weaken concrete or penetrate waterproofing. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers supporting piping expanding into loops, bends and offsets shall be secured to the building structure in such a manner that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion. All such hangers shall be finally adjusted, both in the vertical and horizontal direction.
- J. Pipe hangers shall be of the clevis type, except where otherwise noted.
- K. Where piping is run near the floor and not hung from the ceiling construction but is supported from the floor, such supports shall be of pipe standards with base flange and adjustable top yoke similar to Grinnell Fig. 264 or equal.
- L. Except where otherwise noted, piping shall be supported from structural steel only. Provide supplementary steel where required. Piping shall not be hung from other piping, ducts, conduits or from equipment of other trades.
- M. Where additional steel is required for the support of hangers, furnish and install same subject to the approval of the Architect. Piping shall not be supported from the metal deck slab construction.
- N. All piping running on walls shall be supported by means of hanger suspended from heavy angle iron wall brackets. No wall hooks will be permitted.
- O. Lateral bracing of horizontal pipe shall be provided where required to prevent side sway or vibration. The lateral bracing shall be of a type approved by the Architect and shall be installed where directed by the Architect. All piping shall be seismically restrained in accordance with NFPA 13.
- P. All anchors shall be separate and independent of all hangers, guides and supports. Anchors shall be of heavy blacksmith construction suitable in every way for the work approved by the Architect. Anchors shall be welded to the pipe and fastened to the structure with anchor type bolts.
- Q. All horizontal steel pipe shall be supported at maximum intervals as follows: Steel pipe - up to 1'-1/2" - 12'-0"; 1'-1/2" and larger 15'-0". In no case shall a pipe extend more than 12" past a hanger without additional support.
- R. Trapeze type hangers shall be made up of angles bolted back-to-back or channels for supporting parallel lines of piping. Trapeze type hangers shall be supported with suspension rods having double nuts, and securely attached to construction with inserts, beam clamps, steel fishplates, cantilever brackets, lag screws or other approved means. Kindorf or other materials typically used for the support of electrical equipment or conduit are not acceptable.

Use approved type brackets for supporting piping attached along walls. Piping supported by trapeze hangers shall be provided with hold down clamps at the trapeze hangers.
- S. Maximum weights on hanger rods shall be such that stress in tension shall not exceed 9,000 psi, using root area of threaded portion. In no case shall hanger sizes be less than 3/8" for pipe up to 4", 1/2" for pipe 5", 6" and 8".
- T. Supports for vertical piping shall be double bolt riser clamps, with each end having equal bearing on the building structure located at alternate floors but it shall be no more than 25 feet between supports.

- U. All hangers, rods, inserts, clamps, stanchions, brackets, etc., shall be dipped in zinc chromate primer before installation and provided with one (1) coat of approved type paint after installation.
- V. Chains, straps perforated iron or wire hangers are not permitted.
- W. The Architect must approve method of supporting pipes from building structure before work is started. The Contractor shall bear all responsibility for materials and workmanship as described in this Section, and shall make sure that all hangers and supports are properly and permanently connected to building structure.
- X. All pipe supports shall be installed to avoid interference with other piping, hangers, electrical conduits and supports, building structures and equipment.
- Y. Grooved joint piping systems shall be installed in accordance with the manufacturer's guidelines and recommendations. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be molded and produced by coupling manufacturer. Grooved end shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper gasket sealing. A Victaulic factory-trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools and installation of grooved piping products. Factory-trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.
- Z. Painting: Paint all exposed piping. All exposed piping in finished areas shall be painted in accordance with building code. All bulk main piping 3 inch and larger shall be identified "SPRINKLER-WATER".
- AA. Piping shall be pitched to drain to inspector test connection or drum drip. Branch piping in dry systems shall be pitched at 1/2" per 10', mains shall be pitched at 1/4" per 10'.

3.4 VALVE INSTALLATION

- A. Comply with the following requirements:
 1. Install valves except butterfly with stems pointing up, and as close to vertical as possible. Butterfly valves to be offset at least 10° from vertical.
 2. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and coordinate location with other trades, walls, etc.
 3. Provide drain valves at main shut-off valves, low points of piping and apparatus.
 4. Provide separate support where necessary.
 5. Furnish all valves as indicated on the plans, or as may be required for the proper control of the pipe lines installed under this Specification. All water valves shall have a minimum working pressure of 175 psi, water rated unless otherwise noted on the Drawings or specified herein. All valves shall be of one manufacturer.
 6. All gate valves within the building shall be wedge gate valves with painted iron wheel handles, shall have gland followers in stuffing boxes, and shall be constructed that they may be repacked while open and under pressure. All valves shall have the name of the manufacturer and working pressure cast or stamped thereon.
 7. All gate valves 3" and smaller shall be all bronze with brazed or screwed joint ends as required by the piping system in which they are installed.

8. All gate valves 4" and larger shall have iron bodies with bronze mounting except where otherwise required by the authorities having jurisdiction and shall be provided with screwed or flanged ends as required by the piping system in which they are installed. All gate valves controlling equipment shall be of the OS&Y rising stem type except where space conditions do not permit the installation of this type of valve. In such cases non-rising stem valves with indicators shall be provided.
 9. Globe valves shall be of all bronze with composition disc, threaded or brazed joint ends as required by piping system in which they are installed.
 10. Check valves up to and including 3" shall be all bronze swing check type with threaded or brazed joint ends. Check valves 4" and larger shall be iron body bronze mounting and shall be provided with screwed or flanged joint ends as required by piping system in which they are installed.
 11. Drain valves shall be 3/4" heavy cast brass with composition washers with male thread for hose connections.
 12. All valves on the exterior fire protection water piping shall comply with Local Fire Department and Water Company requirements.
 13. All valves shall have the trademark of the manufacturer and the guaranteed working pressure cast or stamped on the body of the valve. All gates or globes, etc., shall be of one manufacturer and working pressure cast or stamped thereon.
 14. All valves used on the fire standpipe and sprinkler systems water service, shall be approved by the Underwriters' Laboratories and all the other authorities having jurisdiction. Valves shall be iron body bronze mounted OS&Y solid wedge type valves with rising stems for 175 psi minimum working pressures; iron wheel handles shall be painted red. Tamper switch shall be provided on all fire standpipe and sprinkler valves as indicated on the Drawings.
 15. The exterior valves shall conform to all applicable requirements of American Water Works Association C500-61 Standard for Gate Valves for Fire Water Work Service.
 16. The entire fire protection system shall be supplied with valves so located, arranged and operated as to give a complete regulating control to all fixtures and apparatus
 17. Valves, where exposed and used in connection with finished piping, shall be same finish as the pipe.
 18. Do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator.
 19. Select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.
 20. Except as otherwise indicated, install gate, ball, globe, and butterfly valves to company with ANSI B31.1.
 21. Select and install valves with renewable seats, except where otherwise indicated.
- B. Provide chain wheel operators or ladders for valves more than 7' – 0" AFF in mechanical rooms and wherever shown on drawings.
- C. Check Valve Installation
1. Swing and Check Valves:
 - a. Install only in horizontal lines unless absolutely impractical. If installed vertically, flow shall be upwards.
 - b. Do not install in pump discharge piping.
 2. Installation of Check Valves:
 - a. Water Check Valves: Install between 2 flanges in horizontal or vertical position.
 - b. Horizontal Lift Check Valve: Install in horizontal piping line with stem vertically upward.
 - c. Vertical Lift Check Valve: Install in vertical piping line with upward flow with stem vertically upward.
 - d. Air Compressor Lift Check Valve: Install in air compressor discharge line.

- e. Spring Loaded Horizontal Lift Check Valve: Install in horizontal piping line with stem vertically upward.

3.5 AUTOMATIC FIRE SPRINKLER HEAD INSTALLATION

- A. All sprinkler heads shall be in alignment, and parallel to ceiling features, walls, etc. The Contractor shall provide one (1) spare sprinkler cabinet complete with sprinkler wrench and 12 sprinklers of assorted temperature ratings of the type necessary and in use throughout each system at each main riser. The Contractor shall be responsible for the removal and replacement of ceilings, providing ceiling access panels, cutting, patching and restoration of finishes as necessary.
- B. Conform to spacing and dimensional constraints indicated by the Architect on the reflected ceiling plans.
- C. Sprinkler heads shall be centered within ceiling grid.
- D. Where no ceiling grid is provided the heads shall be aligned with any fire alarm device or light fixture in the vicinity.
- E. The sprinkler bulb protector must remain in place until the sprinkler is completely installed and before the system is placed in service. Remove bulb protectors carefully by hand after installation. Do not use any tools to remove bulb protectors.
- F. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install sprinklers with cracked bulbs.

3.6 FIRE STOPS AND PENETRATION SEALS

- A. All new piping penetrations through fire rated floors and walls shall be sealed with fire resistant sealant to prevent the spread of smoke, fire, toxic gas, and water through the penetration either before, during or after a fire. The fire rating of the penetration seal shall be at least that of the floor or wall into which it is installed.
- B. See additional requirements elsewhere in this specification.

3.7 FIRE DEPARTMENT CONNECTION INSTALLATION

- A. Install check valve and ball drip valve where they will not be subjected to freezing temperatures. The discharge line from the ball drip valve shall be visible.

3.8 PRESSURE GAUGE INSTALLATION

- A. Install pressure gauges at the following locations: street side of check valve; at system side of all control valves. Each gauge connection shall not be less than 1/4" and shall be equipped with a shut-off valve and provision for draining.
- B. The required pressure gauges shall be 3" diameter minimum and shall have a maximum limit not less than twice the normal working pressure at the point where installed. They shall be installed to permit removal, and shall be located where they will not be subject to freezing.

3.9 TAMPER SWITCH INSTALLATION

- A. Install tamper switches on all control valves.

3.10 FIRE ALARM WIRING

- A. All fire alarm and monitor wiring shall be done under the Electrical Division but the proper operation of signaling devices will be the fire protection Contractor's responsibility.

3.11 FLOOR CONTROL VALVE INSTALLATION

- A. Floor control valve shall be a complete assembly consisting of an OS&Y valve, grooved butterfly pressure reducing valve (if required), vane type flow switch with retard, inspector's test and main drain valves.
- B. Pipe discharge from inspector's test and main drain valves through sight glass and orifice to a drain riser or floor drain.
- C. This contractor shall install drain risers to serve floor control valves.

3.12 PIPE TESTING

- A. The entire fire protection piping system shall be tested hydrostatically at not less than 200 psi pressure for two hours, or at 50 psi in excess of the maximum static pressure when the maximum static of pressure is in excess of 150lbs. The hydrostatic test pressure shall be measured at the low point of the individual system or zone being tested. Each complete system (all associated piping and alarms), shall be tested and accepted as a complete unit, with data recorded on an approved "Contractor's Material and Test Certificate". System pressure tests shall be against a blank test flange and not against a valve seat.
- B. All tests shall be conducted in the presence of the Architect and Owner. Any system failing to meet the specified test requirements shall be repaired and retested at no additional cost, until the test requirements are met.

3.13 MAINTENANCE AND OPERATIONAL INSTRUCTIONS

- A. System description, system theory of operation, and system final inspection and acceptance documents of the completed system (as built) shall be submitted in a bound book as described in Division 1. The maintenance manuals and instructions shall include a brief description of the type of system installed, routine-type maintenance work defined by step-by-step instructions that should be performed to ensure long life and proper operation, and the recommended frequency of performance. The instructions shall also include possible trouble spots with diagnosis and correction of each. The theory of operation brochures shall describe the function of each component or subassembly in block-diagram type presentation to a degree that a craftsman will understand the system well enough to operate and maintain it.

3.14 PROTECTION

- A. Protect all apparatus, fixtures, materials, equipment, and installations so as to prevent damage as a result of new work. The Contractor shall replace at his own expense any item, which is marred, defaced, broken, or damaged in any way, prior to the date of Notice of Acceptance.

3.15 PAINTING

- A. Contractor shall paint all exposed new and existing fire protection systems to allow for rapid identification by FDNY at all times. New work shall be painted at time of installation; existing systems shall be painted immediately upon exposure to view. Contractor shall continuously update system painting to remain current and accurate at all times. All systems removed from service shall be suitable marked.

3.16 LABELING

- A. All piping, valves, devices, etc., shall be labeled in accordance with the requirements of the code, referenced standards, local laws and fire department directives.

END OF SECTION

SECTION 21 90 00**FIRE SUPPRESSION SYSTEM PROJECT CLOSEOUT****PART 1 – GENERAL****1.1 WORK INCLUDED**

- A. The contractor shall summarize and document adherence with the requirements of the specifications for project closeout including:
 - 1. Copies of all warranties
 - 2. Operation & Maintenance Manuals
 - 3. Required tests
 - 4. Test and balance reports
 - 5. Record drawings
 - 6. Permit requirements
 - 7. Valve tag list
- B. The contractor shall compile a closeout manual which shall include:
 - 1. A list of all required tests and a place for signoff of date completed.
 - 2. A list of all submittals with dates of acceptance by the engineer.
 - 3. A schedule indicating dates for beginning testing and startup of equipment and dates of tests to be witnessed by the engineer, or designated representative, as required by the specifications.
 - 4. Test procedures to be used for life safety systems.
 - 5. Project close out check list.
- C. The final closeout manual shall include the following:
 - 1. Test reports as required by the specifications with signoff by the appropriate individual (engineer, architect, building official, etc.).
 - 2. Documentation indicating all equipment is operating properly and is fully accessible for maintenance.
 - 3. Copies of all warranties.
- D. This section only includes the requirements for documentation of the contract documents, by the contractor, for project completion. This section does not in any way decrease the scope of any of the drawings or specifications.

1.2 SUBMITTALS

- A. Within 90 days after notice to proceed submit a preliminary closeout manual with the following:
 - 1. A list of all required tests.
 - 2. Preliminary schedule showing major milestones for completion of the fire protection systems.
- B. Within 30 days of the first major milestone submit the completed closeout manual as described in Part 1.
- C. Within 2 weeks of substantial completion submit a completed "Project Closeout Check List", and the Final Closeout Manual.

Listed below is a checklist for use by the contractor. This list is not all inclusive for this project.

Project Close-Out Summary – Fire Protection

- ☐ All required submittals have been submitted and either been approved or modified in accordance with the Engineer's "make corrections noted" comments.
- ☐ All equipment has been started up and is functioning within manufacturers' recommendations without any undue noise or vibration. (Submit a list of equipment with startup dates. Provide list at a point 65% into construction schedule).
- ☐ Access doors have been installed as required for concealed equipment, valves, etc.
- ☐ All equipment has been installed with the manufacturers recommended and code required service clearances and is fully accessible for required maintenance.
- ☐ All equipment and piping is labeled per specifications.
- ☐ All action items are complete as listed in the action items reports. Submit a list of action items with sign off by Architect or Engineer for record. Punch list to be completed prior to turn over of building.
- ☐ Fire sprinkler system tested per specifications.
- ☐ Operation and maintenance manuals submitted with table of contents and required documentation for extended warranties.
- ☐ Factory Testing documented and submitted for record.
- ☐ Record drawings submitted to Engineer and Architect per specifications.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EQUIPMENT STARTUP AND TESTING

- A. Prior to completion and punchlist by the engineer, the contractor shall startup and test each piece of equipment as required by the specifications. The contractor shall provide documentation of all required tests with signoff of by the appropriate individual (engineer, architect, and building official).

3.2 TESTING AND ADJUSTMENT FOR FIRE PROTECTION WORK

- A. All tests shall be made in the presence of the Architect or their representatives, and the local authorities having jurisdiction of the work to be tested, as may be directed; and at least 72 hours notice shall be given in advance of all tests.
- B. The Work of this Contractor shall include the furnishing of all testing instruments, gauges, pumps, smoke machines, and other equipment required or necessary for tests, required by laws, rules and regulations and as specified.

- C. Provide all other tests required by local inspectors and all other authorities having jurisdiction.
- D. All appurtenances shall be operated after installation to determine whether or not they meet the requirements of the Specifications.
- E. All defects disclosed in the work be tests and otherwise shall be made good or the Work replaced without additional cost to the Owner. No caulking on screwed joints, cracks or holes will be acceptable.
- F. Tests shall be repeated after any defects disclosed thereby have been made good or the work replaced if it is deemed necessary.
- G. All tests shall be made at the expense of the Contractor.
- H. Tests are not permitted to be made with air except as noted.
- I. Contractor to provide required test plug tee fittings during erection of pipe system.
- J. If the pipe installation fails to meet testing requirements, the Contractor shall determine at his own expense the source or sources of leakage, and he shall repair or replace all defective materials or workmanship. The completed pipe installation shall meet the requirements of the tests after the leaks have been corrected.
- K. All piping which is to be enclosed in partitions or hung ceilings shall be tested and made tight when directed by the Construction Supervisor and in adequate time to permit the installation of partitions and ceilings. When necessary, the Contractor shall drain the piping and/or take over such precautions as required to prevent damage by freezing.
- L. The Contractor shall also be responsible for the Work of other trades that may be damaged or disturbed by the tests, or the repair or replacement of his Work, and he shall, without extra charges, restore to its original condition any Work so damaged or disturbed.
- M. Before any paint is applied, the fire standpipe system shall be tested hydrostatically at not less than 200 psi pressure for two (2) hours minimum, and in accordance with all requirements of the authorities having jurisdiction and NFPA latest edition.
- N. Any fees charged by FDNY for false alarms associated with construction activities will be the responsibility of the Contractor.

3.3 LIFE SAFETY SYSTEMS

- A. All life safety systems shall be fully and successfully tested by the contractor before being witnessed by the engineer or building official
- B. The contractor shall provide a detailed test procedure, with instrumentation to be used, for approval by the engineer and building official prior to any testing.
- C. Once tested by the contractor and fully operational, the systems shall be demonstrated to the engineer. Once accepted by the engineer the system shall be demonstrated to the building and fire officials.

3.4 COORDINATION WITH OTHERS

- A. The Division 21 through 23 contractor shall coordinate his requirements with the General Contractor to ensure the other building systems are completed to the point that they will not adversely affect the operation of the Division 21 through 23 systems.

3.5 PUNCH LISTS

- A. The contractor shall submit in writing that the project is ready for final review by the engineer.
- B. Once the project is ready for final review the engineer will create a punch list of any corrections or deficiencies.
- C. The contractor shall complete all punch list items and provide a letter to the architect after completion stating all items have been completed or reasons why they were not completed.
- D. Upon receipt of this letter the engineer will verify that the punch list has been satisfactorily completed.

END OF SECTION