

## SECTION 210610

### FIRE SUPPRESSION PIPING AND APPURTENANCES

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

##### 1.2 SUMMARY

- A. This Section includes piping, valves, and appurtenances common to the following systems:
  - 1. Fire sprinkler systems
- B. This Section includes piping, valves, and appurtenances:
  - 1. Iron pipe and fittings
  - 2. Steel pipe and fittings

##### 1.3 DEFINITIONS

- A. Shop Drawings: Documents, including working drawings, calculations, and material certifications prepared according to NFPA 13, NFPA 14, and the requirements of the authorities having jurisdiction.
- B. The following are industry abbreviations for rubber materials:
  - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
  - 2. NBR: Acrylonitrile-butadiene rubber.

##### 1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Components and Installation: Capable of producing piping systems with 175-psig (1200-kPa) minimum working-pressure rating for sprinkler systems and 300-psig (2070-kPa) for Standpipe systems, unless otherwise indicated, or as required by Local Code.

##### 1.5 SUBMITTALS

- A. Product Data: For the following:
  - 1. Pipe and fitting materials and methods of joining.
  - 2. Transition fittings.

3. Dielectric fittings.

- B. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13 and NFPA 14. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.
- B. Standpipe and Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- D. NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the following, in addition to local code and other applicable sections of Division 21:
1. NFPA 13, "Installation of Sprinkler Systems."
- E. Steel Support Welding: Qualify processes and operators according to AWS D1. 1, "Structural Welding Code-Steel."
- F. Applicator: Company specializing in piping installation with seven years minimum experience.
- G. Installer Qualifications: An experienced installer who has designed and installed fire-suppression piping similar to that indicated for this Project and obtained design approval and inspection approval from authorities having jurisdiction.
- H. Systems, installation, equipment and materials shall conform to requirements of the local Building Code, Owners Insurance Underwriters, Factory Mutual, Industrial Risk Insurers, local Fire Department, NFPA, ANSI/ASME B3 1.9 "Building Service Piping" and all authorities having jurisdiction. Equipment and materials shall be Underwriters listed, labeled and approved as required.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 21 Specialty Section 21 06 10 "Fire Suppression Piping and Appurtenances" for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1 .20.1 for factory-threaded pipe and pipe fittings.

## 2.2 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
  - 2. Substitutions will not be permitted unless approved by the engineer.

## 2.3 PIPING MATERIALS

- A. Provide the following pipe materials listed here in and as required in other Division 21 Sections.
- B. Materials indicated are subject to approval of local governing authorities. All piping and fittings shall be metal, and plastic.
- C. Each pipe length shall have the manufacturer's name cast, stamped or rolled on.
- D. Each fitting shall have the manufacturer's symbol and pressure rating cast, stamped or rolled on, and shall be pressure rated and suitable for the system it is being used for.

## 2.4 PIPE JOINTS AND FITTINGS:

- A. Use the following pipe joints and fittings listed here in and referenced in other Sections of Division 21.

## 2.5 STEEL PIPE AND FITTINGS

- A. Comply with UL 213 and AWWA C606 for steel pipe dimensions.
- B. Steel pipe (Stl.): Welded or seamless, with maker's name stamped or rolled into each length. Pipe shall be black steel ANSI B125.1 and B125.2.
  - 1. Standard-Weight: Comply with ASTM A 53, ASTM A 135, or ASTM A 795; Schedule 40 in NPS 6 (DN1 50) and smaller.
- C. Steel Fittings: Comply with UL 213 and AWWA C606, for Steel-Pipe Dimensions.
  - 1. Threaded Couplings: ASTM A 865.
  - 2. Welding Fittings: ASTM A 234/A 234M, ASME B16.9, or ASME B16.11.
  - 3. Flanges and Flanged Fittings: ASME B16.5.
  - 4. Grooved-End Fittings: UL-listed and FM-approved, ASTM A 47 (ASTM A 47M), malleable iron or ASTM A 536, ductile iron; with dimensions matching steel pipe and ends factory grooved according to AWWA C606.
- D. Joints between lengths of steel pipes: Screwed, flanged or victaulic approved type only. Make screwed joints without the use of lampwick or filler, except "utility compound" or Permacel teflon tape applied to make threads only.
- E. Mechanical victaulic type joint

1. For steel pipe victaulic type 77, 75, 72 and zero flex are the only approved coupling to be used with grooved piping. Couplings shall be galvanized when used with galvanized piping. All grooves on piping that is galvanized shall be properly cleaned and provided with zinc chromate primer. See pipe material schedule.

F. Welding Filler Metals: Comply with AWS D1 0.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

## 2.6 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

1. Manufacturers:
  - a. Cascade Waterworks Mfg. Co.
  - b. Dresser Industries, Inc.; DMD Div.
  - c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
2. Underground Piping: AWWA C219, metal sleeve-type coupling.
3. Aboveground Pressure Piping: Pipe fitting.

## 2.7 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1 725-kPa) minimum working pressure at 180 deg F (82 deg C).

1. Manufacturers:
  - a. Watts Industries, Inc.; Water Products Div.
  - b. Zurn Industries, Inc.; Wilkins Div.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 300-psig (2070-kPa) minimum working pressure as required to suit system pressures.

1. Manufacturers:
  - a. Epco Sales, Inc.
  - b. Watts Industries, Inc.; Water Products Div.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Manufacturers:
  - a. Advance Products & Systems, Inc.
  - b. Central Plastics Company.
  - c. Pipeline Seal and Insulator, Inc.
2. Separate companion flanges and steel bolts and nuts shall have 300-psig (2070-kPa) minimum working pressure where required to suit system pressures.

- F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).
  - 1. Manufacturers:
    - a. Calpico, Inc.
    - b. Lochinvar Corp.
- G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).
  - 1. Manufacturers:
    - a. Precision Plumbing Products, Inc.
    - b. Sioux Chief Manufacturing Co., Inc.
    - c. Victaulic Co. of America.

### PART 3 - EXECUTION

#### 3.1 PIPING SYSTEM COMMON REQUIREMENTS

- A. Install piping according to the following requirements the Division 21 Sections specifying piping systems. See Section 21 05 05 "General Materials".
- B. No pipes, valves or other apparatus shall be installed so as to interfere in any way with the full swing of the doors.
- C. Where so shown, or required, piping shall be installed concealed in building construction.
- D. All screwed pipe throughout the job shall be reamed smooth before being installed. Pipe shall not be split, bent, flattened nor otherwise injured either before or during the installation.
- E. Where piping is required to be hung from other than stone concrete slabs, such as pre-cast or metal decking, submit proposed method of support to the structural engineer for approval prior to installation. See Section 21 05 29 "Supports and Hangers" for additional requirements.
- F. Piping may be hung from structural steel by means of beam attachments. All auxiliary steel required for support shall be provided by this trade. See Division 21 Section 21 05 29 "Supports and Hangers" for additional requirements.
- G. Do not hang piping from ductwork, except a 1" drop branch to a maximum of two heads.
- H. The Contractor may coordinate with other contractors to use common means of support. Submit for approval all pertinent design data relating to the support as well as verification of the responsibility for the support. See Section 21 05 29 "Hangers and Supports" for additional requirements.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation as required.

- K. Select system components with pressure rating equal to or greater than system operating pressure.

### 3.2 PIPING APPLICATIONS

- A. Do not use welded joints with galvanized steel pipe.
- B. Flanges, unions, and transition and special fittings with pressure ratings the same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.
- C. Sprinkler Piping shall be per Section 21 06 15 "Fire Sprinkler Systems".

### 3.3 COMMON PIPING JOINT CONSTRUCTION

- A. Refer to Section 21 05 05 "Common Work Results for Fire Protection" for common installation requirements.
- B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
  - 1. Deviations from approved shop drawings for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- C. Join pipe and fittings according to the schedule on the contract drawings, the Division 21 Sections specifying piping systems and the following requirements.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- F. Dissimilar-Piping-Material Joints: Construct joints using adapters or couplings compatible with both piping materials. Use dielectric fittings if both piping materials are metal.
- G. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and NFPA 14 and in Section 21 05 53 "Identification".

### 3.4 IRON PIPING JOINT CONSTRUCTION

- A. Ductile-Iron-Piping, Grooved Joints: Use ductile-iron pipe with radius-cut-grooved ends; ductile-iron, grooved-end fittings; and ductile-iron, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
- B. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

### 3.5 STEEL PIPING JOINT CONSTRUCTION

- A. Steel-Piping, Grooved Joints: Use Schedule 40 steel pipe with cut or roll-grooved ends and Schedule 30 or thinner steel pipe with roll-grooved ends; steel, grooved-end fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.
- B. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1 .21.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- C. Welded Joints: Construct joints according to AWS D1 0.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- D. Jurisdiction and as indicated on the contract documents at connection to water service.

### 3.6 PIPING INSTALLATION

- A. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- B. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.
- C. Install piping with drains for complete system drainage.
- D. Hangers and Supports: See Section 21 05 29 "Fire Protection Supports and Hangers".
- E. Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated.
- F. Install pressure gauges on riser or feed main, at each sprinkler test connection, and at top of each standpipe as called for in other sections of Division 21. Include pressure gauges with connection not less than NPS 1/4 (DN8) and with soft metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and install where they will not be subject to freezing.

3.7 FIELD QUALITY CONTROL

- A. Flush, test, and inspect all piping according to Section 21 05 00 "Common Work Results for Fire Protection".
- B. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
- C. Report test results promptly and in writing to Architect and authorities having jurisdiction.

3.8 PROTECTION AND CLEANING

- A. Clean dirt and debris from piping. See Section 21 05 00 "Common Work Results for Fire Protection".

3.9 COMMISSIONING

- A. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.
- B. Verify that specified tests of piping are complete.
- C. Fill wet-pipe systems with water. Contractor shall restrict the fill rate to avoid water hammer within the fire suppression systems.
- D. Flush debris from piping in accordance with NFPA requirements.
- E. Perform hydrostatic testing and certifications as required by NFPA and the Authority Having Jurisdiction.

END OF SECTION 210610



## SUPPLEMENTAL FIRE PROTECTION REQUIREMENTS

## 1.1 RELATED DOCUMENTS

- ## 1.2 SUMMARY

- ### 1.3 COORDINATION

- #### 1.4 SCOPE OF WORK:

- ## 1.5 CONTRACT DOCUMENTS:

- |  |          |   |
|--|----------|---|
| Lincoln Medical and<br>Mental Health Clinic<br>New Clinic Renovation | 210300-1 | Supplemental Fire Protection Requirements |
|--|----------|---|

1.6 CODES, PERMITS AND INSPECTIONS:

A. Permits

1. Obtain permits, pay fees and issue notices, required by state and local codes,
2. Provide required drawings, calculations, and testing all performed by a licensed engineer in the state of New York. Include costs in bid price.
3. Provide copies of permits, certificates, and test reports to the engineer.

B. The requirements of applicable national, state, and local codes, laws, and regulations governing or relating to any portion of this work shall be incorporated into and made a part of these specifications. Contractor is to inform engineer of any existing work or materials which are in conflict with any of the above laws and regulations. Any work done by the contractor causing such violation shall be corrected at contractor's expense by this contractor and at no additional cost to the owner.

C. The city of New York shall perform all controlled inspections as required.

D. All applicable equipment shall be acceptable for use including all certifications and standards as required by the authority having jurisdiction.

1.7 BUILDING RULES AND REGULATIONS:

A. See Section 01 10 00 – Summary of Work

1.8 WORK RESTRICTIONS:

A. See Section 01 10 00 – Summary of Work

1.9 SITE VERIFICATION:

A. See Section 01 73 00 – Execution.

1.10 GUARANTEE:

A. See Section 01 40 00 – Quality Requirements.

1.11 SUBSTITUTION PROCEDURES

A. See Section 01 25 00 – Substitutions

## 1.12 PROJECT COORDINATION

### A. Coordination:

1. Verify that electrical characteristics of equipment are compatible to building system electric prior to ordering equipment.
2. Prior to ordering equipment, verify that electrical characteristics of equipment are the same as the equipment used as the basis of design, including load, required wire size, breaker size and control.
3. Coordinate work with subcontractors and suppliers as well as with other contractors. Coordinate locations of equipment, appurtenances, piping, ductwork, loads, conduit, panels and wiring before installation to avoid conflicts.
4. If a conflict occurs, contractors who installed work without coordinating with other trades and the building structure will be required to remove their work, coordinate with other contractors and the building structure, and then reinstall it without additional compensation or extensions of time. No claims will be considered as a result of failure to coordinate. Engineer's decision is final.
5. Coordinate work with owner. Verify that installation does not interfere with the owner's operations. coordinate with owner and acquire permission in writing, two (2) weeks in advance, of disconnecting the owner's utilities, changing construction operations, closing building exits, changing paths of egress, closing streets, closing walkways or beginning any excavations.
6. Coordinate work with locations of cabinets, shelving, architectural features, fixtures, diffusers, and outlets with other finish el.
7. Coordinate tests and inspections with authorities having jurisdiction, subcontractors, suppliers, other contractors and the owner.
8. Coordinate start-up operations with other contractors, subcontractors, suppliers and manufacturer. Assure that other contractors, subcontractors, suppliers and manufacturer are present for start-up operations.

### B. Composite Coordination Drawings:

1. Prepare composite coordination drawings in accordance with the requirements in individual sections, where installation is not completely shown on shop drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
2. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts.
  - a. Indicate functional and spatial relationships of the components of architectural, structural, plumbing, fire protection, mechanical, and electrical systems, as well as all other components as required.
  - b. Indicate dimensions shown on the drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to engineer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the contract.

3. Organize coordination drawings to show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on drawings. Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment. Indicate structural penetrations and openings as required.
4. Submit coordination drawings to the engineer for record only. The engineer will not review coordination drawings. The details of the coordination are the contractor's responsibility. Receipt of drawings does not constitute approval of drawing, extra service or future change order request.

C. Requests for Information (RFIs):

1. See Section 01 13 13 - Coordination
2. Engineer's action may include a request for additional information, in which case engineer's time for response will date from time of receipt of additional information:

1.13 QUALITY REQUIREMENTS

- A. See Section 01 40 00 – Quality Requirements.

1.14 REFERENCES

- A. See Section 01 00 00 – General Requirements

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

- A. Product Delivery, Storage, and Handling:

1. See Section 01 73 00 – Execution.

- B. Equipment:

1. Provide equipment that complies with the applicable codes, references and standards. Equipment shall bear the stamps and labels indicating that the equipment complies with pertinent standards.
2. Provide equipment that meets the requirements of the project conditions including, but not limited to: features, options, size, access, service, electrical characteristics, controls and installation. Coordinate equipment size, details, electric characteristics, electric load, control and installation with equipment supplier, control contractor and electrical contractor and other trades that may affect the bid price prior to submitting the bid and

prior to ordering your equipment. No additional costs will be considered as a result of failure to coordinate.

3. Equipment shall be installed in strict accordance with the manufacturer's recommendations. The contractor shall obtain detailed installation instructions from the manufacturer prior to installing the equipment. This shall include wiring diagrams for the specific installations which shall be coordinated with the ATC subcontractor, electrical contractor and other contractors affected by the installation of the equipment.
4. Installation instructions and wiring diagrams shall become part of the operations and maintenance manuals.

C. Starting and Adjusting:

1. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest. Adjust equipment for proper operation. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
2. Engage the services of various manufacturers supplying the equipment for the proper startup and operation of all systems installed. Instruct the owner's personnel in the proper operation and servicing of the system.
3. Equipment and appurtenances shall operate properly without objectionable noise, vibration or movement as determined by the engineer. Corrections to the installation shall be made by the contractor, as required by the engineer, without additional cost or time extension.
4. Damaged or defective equipment shall be replaced by the contractor without additional cost or extension of time.

## PART 3 - EXECUTION

### 3.1 GENERAL EXECUTION

A. Quality Assurance:

1. Existing conditions: the location of utilities and construction indicated as existing are not guaranteed. Before beginning work, the contractor shall investigate and verify the location of mechanical and electrical systems, and other construction affecting the work.
2. Before construction, examine roughing-in for mechanical, plumbing, and electrical systems to verify actual locations of connections before equipment and fixture installation. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed. Verify the location and invert elevation at points of connection of fire protection, plumbing, mechanical, and electrical services, as well as related architectural and structural elements.
3. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the work indicates acceptance of existing conditions.
4. Verify space requirements and dimensions of items shown diagrammatically on drawings. Furnish information to owner that is necessary to adjust, move, or relocate

existing structures, services, or other appurtenances obstructing or affected by construction.

B. Installation:

1. Locate the work and components of the work accurately, in correct alignment and elevation, as indicated. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement. Conceal pipes in finished areas, unless otherwise indicated.
2. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until substantial completion.

C. Cutting and Patching: See Section 01 73 29 – Cutting and Patching

D. Progress Cleaning: See Section 01 73 00 – Execution.

3.2 TESTING, ADJUSTING, AND BALANCING

- A. Defects disclosed by the tests shall be repaired or replaced. Tests shall be repeated as directed until all work is proven satisfactory.
- B. Takes all precautions necessary to prevent damage to the building and its contents as a result of such tests. Repair any damage caused.

3.3 CLOSEOUT PROCEDURES

- A. See Section 01 77 00 – Closeout Procedures.

END OF SECTION 210300

## SECTION 210500

### COMMON WORK RESULTS FOR FIRE SUPPRESSION

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Materials and installation instructions common to most fire suppression work.
  - 2. Escutcheons.
  - 3. Grout.
  - 4. Fire-suppression demolition.
  - 5. Equipment installation requirements common to equipment sections.
  - 6. Painting and finishing.
  - 7. Supports and anchorages.

##### 1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for rubber materials:
  - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.

2. NBR: Acrylonitrile-butadiene rubber.

#### 1.4 SUBMITTALS

- A. Product Data: Submit shop drawings and materials certifications for the following:
  1. Piping
  2. Valves
  3. Hangers, Supports
  4. Escutcheons.
  5. Other materials as noted in other sections of this project manual.
- B. Welding certificates.

#### 1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

#### 1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for fire-suppression items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.



2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

## 2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 1 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

## 2.3 JOINING MATERIALS

- A. Refer to individual Division 21 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
  1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8 inch maximum thickness unless thickness or specific material is indicated.
    - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
  2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements for Joining CPVC Plastic Piping: ASTM F 493.

## 2.4 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
  1. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
  2. One-Piece, Stamped-Steel Type: With set screw and chrome-plated finish.

3. One-Piece, Floor-Plate Type: Cast-iron floor plate.
4. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

## PART 3 - EXECUTION

### 3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 21 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping to permit valve servicing.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Sleeves are not required for core-drilled holes.
- J. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- K. Verify final equipment locations for roughing-in.
- L. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.2 ESCUTCHEONS

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
- C. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
  1. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
  2. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.

3. Insulated Piping: One-piece, stamped-steel type with spring clips.
4. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
5. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type and set screw.
6. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.

### 3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

### 3.4 PAINTING

- A. Provide labor, materials, and equipment necessary for field prime painting. Protect flooring and equipment with drop cloths and store paint and materials in a location where directed. Using wire brush, remove all oil, dirt, rust and grease before applying paint.
- B. Apply a heavy coat of bituminous solution paint on piping in concrete or cinder fill or exposed above roof and on underground joint clamps.
- C. Apply epoxy primer for steel piping, ductile iron piping (except underground), and all steel and iron work.
- D. Dip in epoxy primer, uncoated hangers, supports, rods and inserts.
- E. Epoxy primer shall be Sherwin Williams MIL-P53022B, or approved equal.
- F. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.
- G. Provide tags on valves at the base building main and riser connection; indicate the tenants name, system type, and floor served. Include hydraulic information at each sprinkler control valve as required by NFPA 13 and the local authority having jurisdiction.

- H. Paint and label all piping in the project area as required by NFPA 13 and the local authority having jurisdiction.
  - 1. All fire suppression valves and piping shall be painted red.

### 3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.
- C. Field Welding: Comply with AWS D1.1.
- D. Attach to substrates as required to support applied loads.DRIP PANS
- E. Provide drip pans under piping when installation over or within 5 ft. of electrical apparatus is unavoidable or in rooms containing electrical equipment or under drainage piping at ceilings of food preparation areas. Pan shall be reinforced, properly supported and made watertight. Provide enclosed type for pressure piping. Extend 1-1/4 in. drain pipe from pan to spill over nearest floor drain or as indicated.

END OF SECTION 210500

## SECTION 210517

### SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

##### 1.2 SUMMARY

- A. Section Includes:
  - 1. Sleeves.
  - 2. Stack-sleeve fittings
  - 3. Sleeve-seal systems

##### 1.3 SCOPE OF WORK

- A. Provide UL-listed fire stopping assemblies for penetrations in all fire or smoke resistance rated walls, floors, roofs, and other assemblies.
- B. Use fire stopping materials and assemblies that are UL listed and have a rating equal to the barrier or assembly which is penetrated.

##### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.

#### PART 2 - PRODUCTS

##### 2.1 PENETRATION FIRESTOPPING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Hilti, Inc.
  - 2. Rectorseal corporation.
  - 3. 3m fire protection products.

- B. Penetration fire stopping: resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
- C. Penetrations in fire-resistance-rated walls: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch w.c. F-rating: not less than the fire-resistance rating of constructions penetrated.
- D. Penetrations in horizontal assemblies: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch w.c. F-rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated. T-rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- E. Penetrations in smoke barriers: Provide penetration fire stopping with ratings determined per UL 1479. L-rating: not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch w.c. at both ambient and elevated temperatures.
- F. Accessories: Provide components for each penetration fire stopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration fire stopping manufacturer and approved by qualified testing and inspecting agency for fire stopping indicated.

## 2.2 SLEEVES

- A. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

## 2.3 STACK-SLEEVE FITTINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Smith, Jay R. Mfg. Co.
  - 2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
- B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with setscrews.

## 2.4 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Metraflex Company (The).
  - 2. Pipeline Seal and Insulator, Inc.

- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  2. Pressure Plates: Stainless steel.
  3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

## PART 3 - EXECUTION

### 3.1 PENETRATION FIRESTOPPING

- A. Installation:
1. Install penetration fire stopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
  2. Install fill materials for fire stopping by proven techniques to fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  3. Identify penetration fire stopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of fire stopping edge so labels will be visible to anyone seeking to remove penetrating items or fire stopping. Include the following information on labels:
    - a. The words "warning - penetration fire stopping - do not disturb. Notify building management of any damage."
    - b. Contractor's name, address, and phone number.
    - c. Designation of applicable testing and inspecting agency.
    - d. Date of installation.
    - e. Manufacturer's name.
    - f. Installer's name.

### 3.2 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch (25-mm) annular clear space between piping and concrete slabs and walls.
- C. Install sleeves for pipes passing through interior partitions.
1. Cut sleeves to length for mounting flush with both surfaces.
  2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
  3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."

- D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in "Penetration Firestopping."

### 3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

### 3.4 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

### 3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
  - 1. Exterior Concrete Walls below Grade:
    - a. Piping Smaller Than NPS 6 (DN 150): Cast-iron wall sleeves with sleeve-seal system.
      - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
  - 2. Concrete Slabs-on-Grade:
    - a. Piping Smaller Than NPS 6 (DN 150): Cast-iron wall sleeves with sleeve-seal system.
      - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
  - 3. Interior Partitions:
    - a. Piping Smaller Than NPS 6 (DN 150) : Galvanized-steel-pipe sleeves.



3.6 FIELD QUALITY CONTROL:

- A. Owner will engage a qualified testing agency to perform tests and inspections. Where deficiencies are found or penetration fire stopping is damaged or removed because of testing, repair or replace penetration fire stopping to comply with requirements. Proceed with enclosing penetration fire stopping with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 210517

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## SECTION 210529

### HANGERS AND SUPPORTS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

##### 1.2 SUMMARY

- A. This Section includes hangers and supports for fire protection system piping.
  - 1. Spring hangers.

##### 1.3 DEFINITIONS

- A. Organizations:
  - 1. NFPA: National Fire Protection Association
  - 2. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.
  - 3. OSHPD: Office of Statewide Health Planning & Development for the State of California. OSHPD assigns a unique anchorage preapproval "R" number to each seismic restraint it tests. The number describes a specific device applied as tested.
  - 4. UL Underwriters Laboratories, Inc.
  - 5. NEMA National Electrical Manufacturers Assn.
  - 6. FM Factory Mutual
  - 7. USAS United States of America Standards Institute
  - 8. ANSI American National Standards Institute
  - 9. AWWA American Water Works Association
  - 10. ASCE American Society of Civil Engineers
  - 11. FEMA Federal Emergency Management Agency
  - 12. DHS Department of Homeland Security
  - 13. GSA United States General Services Administration
  - 14. I.S.O. Insurance Services Organization

##### 1.4 PERFORMANCE REQUIREMENTS

- A. General
  - 1. The fire protection system, including all piping, equipment, and parts thereof shall be designed and constructed in accordance with strength design, load and resistance factor design, allowable stress design, empirical design or conventional construction methods as detailed in ASCE7.

B. Strength

1. The fire protection system shall be designed and constructed to support safely the factored loads in load combinations defined in the code and the "Performance Requirements" Section without exceeding the appropriate strength limit states or allowable stresses for the materials of construction.
2. The fire protection system shall be installed with flexible connections (expansion joints) to accommodate lateral and vertical deflections and drift of the structural systems as detailed in Section 12 of ASCE7.

1.5 GENERAL REQUIREMENTS

- A. It shall be understood that the requirements of this section are complementary to requirements delineated elsewhere for the support and fastening of equipment, piping, etc. Nothing on the drawings or specifications shall be interpreted as a reason to waive the requirements of this section.
- B. For all piping, regardless of size or length of support, all connections to the building structure must be positively made. Connections which depend all or in part on friction for their supporting action are not acceptable.
- C. Do not use branch lines to brace main lines.
- D. Design and obtain approval from authorities having jurisdiction for thrust restraint, hangers, and supports for piping and equipment.

1.6 SUBMITTALS

- A. Product Data: For the following:
  1. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of hanger.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Welding:
  1. Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
  2. Qualify procedures and personnel according to AWS D1. 1, "Structural Welding Code--Steel."
- C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of hangers and supports that are similar to those indicated for this Project in material, design, and extent.



- D. Systems, installation, equipment and materials shall conform to requirements of the local Building Code, Owners Insurance Underwriters, Factory Mutual, Industrial Risk Insurers, local Fire Department, NFPA, ANSI/ASME B3 1.9 "Building Service Piping" and all authorities having jurisdiction. Equipment and materials Underwriters listed, labeled and approved as required.

## 1.8 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into base. Concrete, reinforcement, and formwork requirements are specified in Division 03 Cast-In-Place Concrete.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements of the Local Code, Factory Mutual, Underwriters Laboratory; provide products by those manufacturers indicated.
- B. Pipe Hangers:
  - 1. Toleco
  - 2. B-Line Systems, Inc.
  - 3. Grinnell Corp.

### 2.2 HANGERS AND SUPPORTS:

- A. Piping shall be supported from the building structure in accordance with the standard listed above.
- B. Support hangers from approved concrete inserts where concrete slabs are available.
- C. All hangers, rods, inserts, clamps, stanchions, brackets, shall be dipped in zinc chromite primer before installation or shall be galvanized.
- D. Where "C" clamp hanger attachments are utilized, retainer clips shall be provided on each clamp.
- E. Piping 3" and smaller shall utilize adjustable swivel loop hangers.
- F. Piping 4" and larger shall utilize clevis type hangers only.
- G. All hanger rods shall be double nutted.
- H. Chain straps, perforated bars, wire hangers are not permitted.

### 2.3 FACTORY FINISHES

- A. Manufacturer's standard prime-coat finish ready for field painting.

- B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
  - 1. Powder coating on springs and housings.
  - 2. All hardware shall be electrogalvanized. Hot-dip galvanize metal components for exterior use.
  - 3. Baked enamel for metal components on isolators for interior use.
  - 4. Color-code or otherwise mark vibration isolation and movement control devices to indicate capacity range.

## 2.4 MISCELLANEOUS MATERIALS

- A. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- C. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.
- D. Grout: ASTM C 1107, Grade B, factory-mixed and -packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.
  - 1. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
  - 2. Properties: Nonstaining, noncorrosive, and nongaseous.
  - 3. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- E. All hanger rods shall be dipped in zinc chromite primer before installation or shall be galvanized, all hanger rods shall be double nutted.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and equipment to receive attachments, including vibration isolation and movement control devices for compliance with requirements, installation tolerances, and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified testing agency to perform field quality-control testing.

### 3.3 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger requirements are specified in Sections specifying equipment and systems.
- B. Comply with Factory Mutual, Underwriters Laboratory, NFPA and MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.
- C. Chain straps, perforated bars, wire hangers are not permitted except for lateral (seismic) bracing.
- D. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
  - 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 4" to NPS 30 (DN100 to DN750).
  - 2. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4 (DN1 5 to DN1 00), to allow off-center closure for hanger installation before pipe erection.
  - 3. Adjustable Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 3 (DN20 to DN80).
  - 4. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8 (DN10 to DN200).
- E. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
  - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
  - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
  - 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
  - 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
  - 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.
- F. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
  - 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
  - 2. Top-Beam C-Clamps (MSS Type 19) (Provide retainer clip with each C-Clamps): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
  - 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  - 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
  - 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  - 6. C-Clamps (MSS Type 23) (Provide retainer clip with each C-Clamps): For structural shapes.
  - 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
  - 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
  - 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.

10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
  - a. Light (MSS Type 31): 750 lb (340 kg).
  - b. Medium (MSS Type 32): 1500 lb (675 kg).
  - c. Heavy (MSS Type 33): 3000 lb (1350 kg).
13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where head room is limited.

### 3.4 HANGER AND SUPPORT INSTALLATION

- A. Pipe Hanger and Support Installation: Comply with local code, Factory Mutual, Underwriters Laboratory, NFPA and MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in local code, Factory Mutual, Underwriters Laboratory, NFPA, and MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping (thrust load). Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- C. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
- D. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- F. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- G. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- H. Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by local code, Factory Mutual, Underwriters Laboratory, NFPA, and ASME B3 1.9, "Building Services Piping," is not exceeded.



### 3.5 ADJUSTING

- A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

### 3.6 CLEANING

- A. After completing equipment installation, inspect vibration isolation and seismic-control devices. Remove paint splatters and other spots, dirt, and debris.

### 3.7 PAINTING

- A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
- B. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).
- C. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 Section "Painting."
- D. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 210529

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## SECTION 210553

### IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

##### 1.2 SUMMARY

- A. Section Includes:
  - 1. Warning signs and labels.
  - 2. Pipe labels.
  - 3. Stencils.

##### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Valve numbering scheme.
- D. Valve Schedules: For each piping system, furnish to Owner's Representative three (3) complete framed plastic laminated valve tag schedules. Schedule shall indicate tag number, valve location by floor and nearest column number, valve size and service controlled. Furnish extra copies of the valve and equipment schedules (in addition to mounted copies) to include in maintenance manuals.

##### 1.4 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME A1 3.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

## 1.5 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with location of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

## PART 2 - PRODUCTS

### A. Motor Control Identification

- 1. Mount black lamacoid nameplates on each motor controller identifying primary control function and individual position indication such as Pump No. 1, etc. Nameplates shall be cut through to white background and have beveled edges. Mount with chromium plated acorn head screws.

## 2.2 PIPING IDENTIFICATION DEVICES

### A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

- 1. Apply Opti-code pressure sensitive vinyl color coded pipe markers identifying pipe contents and direction of flow.
- 2. On exposed piping apply markers on 30 foot centers of straight runs, at valve locations, at points where piping enters and leaves a partition, wall, floor or ceiling.
- 3. On concealed piping installed above removable ceiling construction apply markers in manner described for exposed piping.
- 4. On concealed piping installed above non-removable ceiling construction, or in pipe shafts, apply markers at valve or other devices that are made accessible by means of access doors or panels.
- 5. Marker widths shall be 8" for pipes up to 2" diameter and 12" wide for 2-1/2" to 6" diameter piping and 24" wide for larger diameter piping. Letter heights stating service shall be preprinted on marker 3/4" high for 8" markers 1-1/4" high for 12" markers and 2-1/2" high for 24" markers.
- 6. For painted or insulated pipes apply markers after insulation and painting work has been completed.
- 7. Colors shall conform to ANSI Standard A1 3.1. Provide 24 additional markers of each type for future use by Owner's personnel.
- 8. Follow manufacturer's instructions for application procedures using non-combustible materials and contact adhesives. Loop 3/4" wide pressure-sensitive tape of same color as marker background around pipe at both ends of marker and overlap tape on itself a minimum of 2".
- 9. Markers and tape manufactured by Seton Name Plate Co. or other approved.
- 10. Colors: Comply with ASME A1 3.1, unless otherwise indicated.
- 11. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
- 12. Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Full-band pipe markers extending 360 degrees around pipe at each location.

13. Pipes with OD, Including Insulation, 6 Inches (150 mm) and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
14. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.
15. Pretensioned Pipe Markers: Precoiled semirigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.
16. Shaped Pipe Markers: Preformed semirigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.
17. Self-Adhesive Pipe Markers: Plastic with pressure-sensitive, permanent-type, self-adhesive back.
18. Plastic Tape: Continuously printed, vinyl tape at least 3 mils (0.08 mm) thick with pressure-sensitive, permanent-type, self-adhesive back.
19. Width for Markers on Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): 3/4 inch (19 mm) minimum.
20. Width for Markers on Pipes with OD, Including Insulation, 6 Inches (150 mm) or Larger: 1-1/2 inches (38 mm) minimum.

### 2.3 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A1 3.1 for piping; minimum letter height of 3/4 inch (19 mm) for access panel and door markers, equipment markers, equipment signs, and similar operational instructions.
  1. Stencil Material: Metal or fiberboard.
  2. Stencil Paint: Exterior, gloss, acrylic enamel black, unless otherwise indicated. Paint may be in pressurized spray-can form.
  3. Identification Paint: Exterior, acrylic enamel in colors according to ASME A1 3.1, unless otherwise indicated.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS, GENERAL

- A. Products specified are for applications referenced in other Division 13 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.
- B. Provide tags on valves at the base building main and riser connection; indicate the tenants name, system type, and floor served. Include hydraulic information at each sprinkler control valve as required by NFPA 13 and the local authority having jurisdiction.
- C. Paint and label all piping in the project area as required by NFPA 13 and the local authority having jurisdiction.
  1. All fire suppression valves and piping shall be painted red.
  2. All valve handles shall be painted green for sprinklers, red for standpipes, and yellow for combination systems.

### 3.2 EQUIPMENT IDENTIFICATION

- A. Install and permanently fasten equipment nameplates on each major item of fire protection equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:
  - 1. Pumps, compressors, and similar motor-driven units.
  - 2. Install equipment markers with permanent adhesive on or near each major item of fire protection equipment. Data required for markers may be included on signs, and markers.
- B. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
- C. Locate markers where accessible and visible. Include markers for the following general categories of equipment:
  - 1. Main control and operating valves, including safety devices.
  - 2. Fire department hose valves and hose stations.
  - 3. Meters, gauges, and similar units.
  - 4. Pumps, compressors, and similar motor-driven units.
  - 5. Tanks and pressure vessels.
- D. Install equipment signs with screws or permanent adhesive on or near each major item of mechanical equipment. Locate signs where accessible and visible.

### 3.3 PIPING IDENTIFICATION

- A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.
- B. Stenciled Pipe Marker Option: Stenciled markers may be provided instead of manufactured pipe markers, at Installer's option. Install stenciled pipe markers with painted, color-coded bands complying with ASME A13.1 on each piping system.
  - 1. Identification Paint: Use for contrasting background.
  - 2. Stencil Paint: Use for pipe marking.
- C. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior non-concealed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.
  - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.
  - 6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
  - 7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

### 3.4 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

### 3.5 ADJUSTING

- A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

### 3.6 CLEANING

- A. Clean faces of fire protection identification devices and glass frames of valve schedules.

END OF SECTION 210553

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## SECTION 210615

### FIRE SPRINKLER SYSTEMS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

##### 1.2 SUMMARY

- A. This Section includes fire-suppression sprinkler systems, piping, and equipment for the following building systems:
  - 1. Wet and dry, fire-suppression sprinklers, including piping, valves, specialties, automatic sprinklers, air compressor, and accessories.
- B. Work Included:
  - 1. Building or area will be fully sprinkled (exception only as per local code). The work shall include all components as required for a complete sprinkler system, including but not limited to the following:
    - a. Pipe, fittings, hangers, and appurtenances including drain risers,
    - b. Sprinkler heads.
  - 2. All areas will be supplied from a sprinkler riser system as indicated on the contract documents.
- C. Before any work is commenced, working (shop) drawings shall be carefully prepared and submitted for approval. It is required that the sprinkler systems be sized hydraulically in accordance with NFPA standards. Submit hydraulic calculation of each system with shop drawings showing balanced system delivery, and balanced supply and demand for the appropriate hazard class as defined in NFPA 13, latest edition accepted by local authority having jurisdiction. Working drawings and calculations must be reviewed and approved by all governing authorities, Fire Department, Owners Insurance Underwriters, Factory Mutual and/or Industrial Risk Insurers before any work is commenced at the jobsite.

##### 1.3 DEFINITIONS

- A. Working Plans: Documents, including drawings, calculations, and material specifications prepared according to NFPA 13 for obtaining approval from authorities having jurisdiction.
- B. Automatic Sprinkler System: an integrated system of underground and overhead piping includes a suitable water supply, designed in accordance with fire protection engineering standards.

- C. Listed: Equipment, materials or services included in a list published by an organization acceptable to the code enforcement official and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material or service meets identified standards or has been tested and found suitable for a specified purpose
- D. Record ("as built") Drawings: Drawings and documents that record the installed location and performance characteristics of all piping, devices, and components connections of the fire protection system as installed.
- E. Sprinkler Occupancy Hazard Classifications: Shall be per Local Code, NFPA, and Requirements of the Authority having Jurisdiction. In the absence of more restrictive requirements, the following classifications shall apply:
  - 1. Building Service Areas: Ordinary Hazard, Group 1.
  - 2. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
  - 3. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
  - 4. Clinic, Office, Public: Light Hazard.
  - 5. Storage Areas per NFPA 13.
- F. NPS: National Pipe Standard.

#### 1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Design sprinkler piping according to Local Code and to the following and obtain approval from authorities having jurisdiction:
  - 1. Include 10 percent margin of safety for available water flow and pressure.
  - 2. Include losses through water-service piping, valves, and backflow preventers.
- B. Minimum Density for Automatic Wet-Pipe Sprinkler Design: Shall be as follows:
  - 1. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. (6.3 mL/s over 139-sq. m) area.
  - 2. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500- sq. ft. (9.5 mL/s over 139-sq. m) area.
  - 3. Ordinary Hazard Group 2 Occupancy 0.20 over 1500 sq. ft.
- C. Maximum Protection Area per Sprinkler: In accordance with the sprinkler heads listing or as follows:
  - 1. Office: 225 sq. ft. (20.9 sq. m). (when hydraulically calculated)
  - 2. Mechanical Equipment Rooms: 130 sq. ft. (12.1 sq. m).
  - 3. Laboratory: 130 sq. ft. (12.1 sq. m).
  - 4. Other Areas: According to NFPA 13 requirements, unless otherwise indicated.
- D. Working Pressure: System components and installation shall be rated for a minimum working-pressure rating as follows, unless otherwise indicated:
  - 1. Upstream (supply) side of FCV/PRV: 300-psig (2070-kPa).
  - 2. Downstream (zone) side of FCV/PRV: 175-psig (1200-kPa).
- E. The sprinkler heads in all areas are to be installed in the center of the tile or centered with lights, diffusers or similar elements as indicated on the architectural reflected ceiling drawings. Sprinkler heads must also be installed on a true axis line in both directions with a maximum

deviation from the axis line of 1/2" plus or minus. At the completion of the installation, if any heads are found to exceed the above mentioned tolerance, same shall be removed and reinstalled by this Contractor at no additional cost to the Owner.

- F. Provide all sprinkler heads and work in strict conformance with approved shop drawings. The Architect and/or Design Engineer reserves the right to reject any and all work not in accordance with the approved shop drawing.
- G. Whether or not the system shown on the Contract Drawings meets the requirements of the National Fire Protection Association, these specifications require the furnishing and installation of sprinkler systems complete in all details and in accordance with the standards of the National Fire Protection Association.

#### 1.5 SUBMITTALS

- A. Product Data: In addition to the requirements of Section 21 05 00 "Common Work Results for Fire Protection" provide the following:
  - 1. Pipe and fitting materials and methods of joining for sprinkler piping.
  - 2. Pipe hangers, supports and restraints.
  - 3. Valves, including specialty valves, accessories, and devices.
  - 4. Alarm devices. Include electrical data.
- B. Fire-Hydrant Flow Test Report: See Section 21 05 00 "Common Work Results for Fire Protection" for additional information.
- C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction. Include hydraulic calculations, for all applicable systems.
- D. Hydraulic Calculations: Submit hydraulic calculations as part of the shop drawings. Prepare hydraulic calculations in accordance with NFPA 13 and the design criteria indicated on the drawings with the following exceptions:
  - 1. Minimum operating pressure of any sprinkler head shall be according to NFPA 13 and UL listed or/FM approved.
  - 2. Pipe friction losses may be calculated by using the nearest foot for all piping over one foot in length. Horizontal lengths less than one foot may be neglected. Vertical length less than one foot shall be included for elevation purposes only.
  - 3. Flows shall be calculated to the nearest whole gallon.
  - 4. Velocity pressures may be neglected.
  - 5. Velocities in all piping shall not exceed 30 feet per second. Velocities in standpipes must be calculated based on the sprinkler flow and hose flow.
  - 6. The sprinkler/standpipe risers shall accommodate the sprinkler and standpipe hose stream flows. Each riser shall accommodate 250 gallons per minute flow for standpipe hose stream.
  - 7. Provide a minimum 20 psi differential (when applicable) between the available water supply and total system demand of the calculated sprinkler flow plus hose demand at residential pressure required for system.
  - 8. Refer to sprinkler design criteria on drawings for additional information.
- E. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and

Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."

- F. Product Requirement Data: For each type of sprinkler specialty to include in maintenance manuals specified in Division 01 and Section 21 05 00.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has designed and installed fire-suppression piping similar to that indicated for this Project and obtained design approval and inspection approval from authorities having jurisdiction.
- B. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer. Base calculations on results of fire-hydrant flow test.
- C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of fire-suppression piping that are similar to those indicated for this Project in material, design, and extent.
- D. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.
- E. Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction. All components shall be domestically produced by reputable manufacturer with all certificates in place. Components of questionable quality or origin shall not be used.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- G. NFPA Standards: In addition to Local Code Requirements, all Equipment, specialties, accessories, installation, and testing complying with the following:
  - 1. NFPA 13, "Installation of Sprinkler Systems"
  - 2. NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems"

## 1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Sprinkler Cabinets: Finished, wall-mounting steel cabinet and hinged cover, with space for a minimum of six spare sprinklers plus sprinkler wrench. Include the number of sprinklers required by NFPA 13 and wrench for sprinklers. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project. Unless otherwise noted the cabinet shall be located in the fire pump or incoming fire service valve room.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or as scheduled on the drawings:

1. Sprinklers:
  - a. Tyco, Inc.
  - b. Reliable Automatic Sprinkler Co., Inc.
  - c. Viking Corp.
  - d. Victualic Co. of America.

### 2.2 PIPING APPLICATIONS

- A. Drawings indicate pipe and joining types to be used. Where specific valve types are not indicated, the following requirements apply.
- B. Common Piping Requirements:
1. Refer to Section 210610 "Fire Suppression Piping" for applications of pipe, tube, fitting, and joining materials.
  2. Flanges, unions, and transition and special fittings with pressure ratings the same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.
  3. Do not use welded joints with galvanized steel pipe.
- C. Common Joint Requirements:
1. Refer to Section 21 06 10 "Fire Suppression Piping" for common piping joint construction.
  2. Use gaskets listed for dry-pipe service for dry piping.
  3. Dissimilar-Piping-Material Joints: Construct joints using adapters or couplings compatible with both piping materials. Use dielectric fittings if both piping materials are metal. Refer to Section 210505 "Common Work Results for Fire Protection" for dielectric fittings.
- D. Sprinkler Feed Mains and Risers:
1. For all pipe sizes:
    - a. Pipe: Steel pipe, standard-weight, threaded ends;
    - b. Fittings: Cast- or malleable-iron, threaded fittings;
    - c. Joining: Threaded joints.
- E. Wet-Pipe Systems, Sprinkler Branch Piping downstream from sprinkler zone valves:
1. For all pipe sizes:
    - a. Pipe: Steel pipe, standard-weight, threaded ends;
    - b. Fittings: Cast- or malleable-iron, threaded fittings;
    - c. Joining: Threaded joints.

## 2.3 SPRINKLER HEADS

- A. General:
  - 1. Provide approved automatic spray sprinkler heads of Reliable Automatic Sprinkler Co., or other approved manufacturer.
  - 2. Head locations, type and finish as scheduled on the drawings.
  - 3. Dry pendant type heads shall be listed and provided with 1" vertical pipe to horizontal branch, in all areas subject to freezing with hung ceilings or soffits on dry pipe systems.
  - 4. All heads shall be of the proper temperature rating for the locations in which they are installed.
  - 5. Provide sprinkler guards where sprinkler heads are located 7'-0" AFF or where heads are subject to damage.
  - 6. Provide stock of extra sprinkler heads, sprinkler wrenches in accordance with Article 3660 of N.F.P.A. Pamphlet No. 13. Cabinets shall be Reliable or other approved.
- B. Automatic Sprinklers: With heat-responsive element complying with the following:
  - 1. UL 199, for applications except residential.
  - 2. UL 1626, for residential applications.
  - 3. UL 1767, for early suppression, fast-response applications.
- C. Sprinkler Types and Categories: Nominal 1/2-inch (12.7-mm) orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
- D. Sprinkler types, features, and options include the following:
  - 1. Concealed ceiling sprinklers, including cover plate.
  - 2. Extended-coverage sprinklers.
  - 3. Flush ceiling sprinklers, including escutcheon.
  - 4. Institution sprinklers, made with small, breakaway projection.
  - 5. Pendant sprinklers.
  - 6. Quick-response sprinklers.
  - 7. Recessed sprinklers, including escutcheon.
  - 8. Sidewall sprinklers.
  - 9. Sidewall, dry-type sprinklers.
  - 10. Upright sprinklers.
- E. Sprinkler Finishes: Chrome-plated, bronze, or factory painted as directed by the Architect.
- F. Special Coatings: Factory applied Wax, lead, and corrosion-resistant paint. (Fact)
- G. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications, unless alternate finish is specified by architect. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
  - 1. Ceiling Mounting: Chrome-plated steel, one piece, flat.
  - 2. Ceiling Mounting: Chrome-plated steel, two piece, with 1-inch (25-mm) vertical adjustment.
  - 3. Ceiling Mounting: Plastic, white finish, one piece, flat.
  - 4. Sidewall Mounting: Chrome-plated steel, one piece, flat.
  - 5. Sidewall Mounting: Plastic, white finish, one piece, flat.
- H. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

## 2.4 SPECIALTY SPRINKLER FITTINGS

- A. Specialty Fittings: UL listed and FM approved; made of steel, ductile iron, or other materials compatible with piping.
- B. Dry-Pipe-System Fittings: Corrosion Resistant, UL listed for dry-pipe service.
- C. Locking-Lug Fittings: UL 213, ductile-iron body with locking-lug ends.
- D. Mechanical-T Fittings: UL 213, ductile-iron housing with pressure-responsive gasket, bolts, and threaded or locking-lug outlet.
- E. Mechanical-Cross Fittings: UL 213, ductile-iron housing with pressure-responsive gaskets, bolts, and threaded or locking-lug outlets.
- F. Drop-Nipple Fittings: UL 1474, with threaded inlet, threaded outlet, and seals; adjustable.
- G. Sprinkler, Drain and Alarm Test Fittings: UL-listed, cast- or ductile-iron body; with threaded inlet and outlet, test valve, and orifice and sight glass.
- H. Sprinkler, Branch-Line Test Fittings: UL-listed, brass body; with threaded inlet and capped drain outlet and threaded outlet for sprinkler.
- I. Sprinkler, Inspector's Test Fittings: UL-listed, cast- or ductile-iron housing; with threaded inlet and drain outlet and sight glass.

## 2.5 PRESSURE GAUGES

- A. Pressure Gauges: UL 393, 3-1/2- to 4-1/2-inch- (90- to 115-mm-) diameter dial with dial range of 0 to 250 psig (0 to 1725 kPa), or to two times (2x) the working pressure.

# PART 3 - EXECUTION

## 3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article in Part 1 of this Section.
- B. Report test results promptly and in writing.

## 3.2 PIPING INSTALLATION

- A. Refer to Section 21 05 05 "Common Work Results for Fire Protection" for common pipe installation requirements.
- B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- C. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.
- E. Install sprinkler piping with drains for complete system drainage.
- F. Install sprinkler zone control valves, test assemblies, and drain risers adjacent to sprinkler risers when sprinkler branch piping is connected to sprinkler risers.
- G. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.
- H. Install alarm devices in piping systems.
- I. Hangers and Supports: Comply with Section 21 05 29 "Supports and Hangers" and NFPA 13 for hanger materials and installation.
- J. Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated.
- K. Install pressure gauges on riser or feed main and at each sprinkler test connection. Include pressure gauges with connection not less than NPS 1/4 (DN8) and with soft metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and install where they will not be subject to freezing.

### 3.3 SPECIALTY SPRINKLER FITTING INSTALLATION

- A. Install specialty sprinkler fittings according to Section 21 06 10 "Fire Suppression Piping".

### 3.4 VALVE INSTALLATION

- A. For installing general-duty valves. Install fire-protection specialty valves, trim, fittings, controls, and specialties according to NFPA 13, manufacturer's written instructions, and authorities having jurisdiction.
- B. Service Control Valves: Install fire-protection-service valves supervised-open, located to control sources of water supply except from fire department connections. Provide permanent identification signs indicating portion of system controlled by each valve.

### 3.5 SPRINKLER APPLICATIONS

- A. Provide sprinkler heads as indicated and scheduled on the contract drawings.
- B. Sprinkler Finishes: Use sprinklers with the following finishes or as directed by the Architect.



1. Upright, Pendent, and Sidewall Sprinklers:
  - a. Chrome-plated in finished spaces exposed to view;
  - b. Rough bronze in unfinished spaces not exposed to view;
  - c. Wax coated where exposed to acids, chemicals, or other corrosive fumes.
2. Concealed Sprinklers:
  - a. Rough brass, with factory-painted cover plate;
  - b. White or color by Architect.
3. Flush Sprinklers:
  - a. Factory-painted with escutcheon;
  - b. White or color by Architect.
4. Recessed Sprinklers:
  - a. Factory-painted with two piece adjustable escutcheon;
  - b. White or color by Architect.

### 3.6 SPRINKLER INSTALLATION

- A. Sprinkler Heads:
  1. Space, locate, and position sprinkler heads in strict conformance with approved shop drawings. The architect and engineer reserves the right to reject any and all work not in accordance with the approved shop drawing.
  2. Install sprinklers in center of tiles. The sprinkler heads in all areas are to be installed on a true axis line in both directions with a maximum deviation from the axis line of 1/2" plus or minus from architects reflected ceiling plans. At the completion of the installation, if any heads are found to exceed the above mentioned tolerance, same shall be removed and reinstalled by this Contractor.
  3. Do not install wet-type pendant or sidewall sprinklers in areas subject to freezing. Use dry type sprinklers. Locate water supply within heated space. Provide draft guards and insulation as required to prevent freezing.
- B. Protection and cleaning
  1. Protect sprinklers from damage until Substantial Completion.
  2. Perform the following in areas where painting occurs or when sprinkler piping is painted: As soon as sprinkler heads are in place, the Contractor shall cover each head with a small bag of an Underwriter's approved type, which shall be removed only after all painting is complete. After the bag is removed, all heads shall be cleaned and polished.
  3. Clean dirt and debris from sprinklers.
  4. Remove and replace sprinklers having paint other than factory finish.

### 3.7 CONNECTIONS

- A. Water and Drain:
  1. Connect water-supply piping and sprinklers to fire pumps. Include backflow preventers.
  2. Connect water supplies to sprinklers. Include backflow preventers.
  3. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.
  4. Connect piping to specialty valves, specialties, fire department connections, and accessories.

### 3.8 LABELING AND IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements of the Authority having Jurisdiction, NFPA 13 and Section 21 05 05 "Common Work Results for Fire Protection."
- B. Install labeling and pipe markers on equipment and piping according to requirements as required by the Authority having Jurisdiction, NFPA 13 and Section 21 05 53 "Identification."

### 3.9 FIELD QUALITY CONTROL

- A. Flush, test, and inspect sprinkler piping according to the Authority having Jurisdiction, NFPA 13, Section 21 05 00 "Common Work Results for Fire Protection", "System Acceptance" Chapter.
- B. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
- C. Report test results promptly and in writing to Architect and authorities having jurisdiction.

### 3.10 DEMONSTRATION

- A. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.
- B. Schedule demonstration with Owner with at least seven days' advance notice.

END OF SECTION 210615