

## SECTION 210553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

### PART 1 - GENERAL

#### 1.1 SUMMARY

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

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.

### PART 2 - PRODUCTS

#### 2.1 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; pipe size; and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
  - 2. Lettering Size: At least 1-1/2 inches high.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

#### 3.2 LABEL INSTALLATION

- 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 locations of access panels and doors.
- C. Install or permanently fasten labels on each major item of mechanical equipment.
- D. Locate equipment labels where accessible and visible.
- E. Pipe-Label Locations: Locate pipe labels where piping is exposed in ; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
  - 1. Near each valve and control device.
  - 2. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 3. Near major equipment items and other points of origination and termination.
  - 4. Spaced at maximum intervals of 50 feet along each run.

END OF SECTION 210553

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## SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Pipes, fittings, and specialties.
  - 2. Fire-protection valves.
  - 3. Fire-department connections.
  - 4. Sprinklers.
  - 5. Alarm devices.
  - 6. Pressure gages.

#### 1.2 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- B. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Sprinkler system design shall be approved by authorities having jurisdiction.
  - 1. Sprinkler Occupancy Hazard Classifications:
    - a. Building Service Areas: Ordinary Hazard, Group 1.
    - b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
    - c. General Storage Areas: Ordinary Hazard, Group 1.
    - d. Machine Shops: Ordinary Hazard, Group 2.
    - e. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
    - f. Office and Public Areas: Light Hazard.
    - g. Repair Garages: Ordinary Hazard, Group 2.
    - h. Restaurant Service Areas: Ordinary Hazard, Group 1.
  - 2. Minimum Density for Automatic-Sprinkler Piping Design:
    - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
    - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
    - c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
    - d. Special Occupancy Hazard: As determined by authorities having jurisdiction.
  - 3. Maximum Protection Area per Sprinkler: Per UL listing.
  - 4. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Qualification Data: For qualified Installer and professional engineer.

- E. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
  - F. Welding certificates.
  - G. 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."
  - H. Field quality-control reports.
  - I. Operation and maintenance data.
- 1.5 QUALITY ASSURANCE
- A. Installer Qualifications:
    - 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
      - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
  - B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - C. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
    - 1. NFPA 13, "Installation of Sprinkler Systems."
    - 2. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."

## PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

### 2.2 STEEL PIPE AND FITTINGS

- A. Thinwall Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.
- B. Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- C. Malleable- or Ductile-Iron Unions: UL 860.
- D. Cast-Iron Flanges: ASME 16.1, Class 125.
- E. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
- F. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
- G. Grooved-Joint, Steel-Pipe Appurtenances:
  - 1. Pressure Rating: 175 psig minimum.
  - 2. Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
  - 3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

### 2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free.
  - 1. Class 125, Cast-Iron Flat-Face Flanges: Full-face gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

## 2.4 LISTED FIRE-PROTECTION VALVES

- A. General Requirements:
  - 1. Valves shall be UL listed or FM approved.
  - 2. Minimum Pressure Rating: 175 psig.
- B. Check Valves:
  - 1. Standard: UL 312.
  - 2. Pressure Rating: 250 psig minimum.
  - 3. Type: Swing check.
  - 4. Body Material: Cast iron.
  - 5. End Connections: Flanged or grooved.
- C. Bronze OS&Y Gate Valves:
  - 1. Standard: UL 262.
  - 2. Pressure Rating: 175 psig.
  - 3. Body Material: Bronze.
  - 4. End Connections: Threaded.
- D. Iron OS&Y Gate Valves:
  - 1. Standard: UL 262.
  - 2. Pressure Rating: 250 psig minimum.
  - 3. Body Material: Cast or ductile iron.
  - 4. End Connections: Flanged or grooved.
- E. Indicating-Type Butterfly Valves:
  - 1. Standard: UL 1091.
  - 2. Pressure Rating: 175 psig minimum.
  - 3. Valves NPS 2 and Smaller:
    - a. Valve Type: Ball or butterfly.
    - b. Body Material: Bronze.
    - c. End Connections: Threaded.
  - 4. Valves NPS 2-1/2 and Larger:
    - a. Valve Type: Butterfly.
    - b. Body Material: Cast or ductile iron.
    - c. End Connections: Flanged, grooved, or wafer.
  - 5. Valve Operation: Integral electrical, 115-V ac, prewired, two-circuit, supervisory switch visual indicating device.

## 2.5 TRIM AND DRAIN VALVES

- A. General Requirements:
  - 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
  - 2. Minimum Pressure Rating: 175 psig.
- B. Ball Valves:

## 2.6 SPECIALTY VALVES

- A. General Requirements:
  - 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
  - 2. Minimum Pressure Rating: 175 psig.
  - 3. Body Material: Cast or ductile iron.
  - 4. Size: Same as connected piping.
  - 5. End Connections: Flanged or grooved.
- B. Alarm Valves:
  - 1. Standard: UL 193.
  - 2. Design: For horizontal or vertical installation.
  - 3. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.

4. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.
  5. Drip Cup Assembly: Pipe drain with check valve to main drain piping.
- C. Automatic (Ball Drip) Drain Valves:
1. Standard: UL 1726.
  2. Pressure Rating: 175 psig minimum.
  3. Type: Automatic draining, ball check.
  4. Size: NPS 3/4.
  5. End Connections: Threaded.
- 2.7 FIRE-DEPARTMENT CONNECTIONS
- A. Flush-Type, Fire-Department Connection:
1. Standard: UL 405.
  2. Type: Flush, for wall mounting.
  3. Pressure Rating: 175 psig minimum.
  4. Body Material: Corrosion-resistant metal.
  5. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
  6. Caps: Brass, lugged type, with gasket and chain.
  7. Escutcheon Plate: Rectangular, brass, wall type.
  8. Outlet: With pipe threads.
  9. Body Style: Horizontal.
  10. Number of Inlets: One.
  11. Escutcheon Plate Marking: Similar to "AUTO SPKR."
  12. Finish: Rough brass or bronze.
  13. Outlet Size: NPS 4.
- 2.8 SPRINKLER SPECIALTY PIPE FITTINGS
- A. Flow Detection and Test Assemblies:
1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
  2. Pressure Rating: 175 psig minimum.
  3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
  4. Size: Same as connected piping.
  5. Inlet and Outlet: Threaded.
- B. Branch Line Testers:
1. Standard: UL 199.
  2. Pressure Rating: 175 psig minimum.
  3. Body Material: Brass.
  4. Size: Same as connected piping.
  5. Inlet: Threaded.
  6. Drain Outlet: Threaded and capped.
  7. Branch Outlet: Threaded, for sprinkler.
- C. Sprinkler Inspector's Test Fittings:
1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
  2. Pressure Rating: 175 psig minimum.
  3. Body Material: Cast- or ductile-iron housing with sight glass.
  4. Size: Same as connected piping.
  5. Inlet and Outlet: Threaded.
- 2.9 SPRINKLERS
- A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
  2. Pressure Rating for Residential Sprinklers: 175 psig maximum.
  3. Pressure Rating for Automatic Sprinklers: 175 psig minimum.
- B. Automatic Sprinklers with Heat-Responsive Element:
1. Early-Suppression, Fast-Response Applications: UL 1767.
  2. Nonresidential Applications: UL 199.
  3. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
- C. Sprinkler Finishes:
1. Chrome plated.
  2. Bronze.
  3. Painted.
- D. Special Coatings:
1. Wax.
- E. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
1. Ceiling Mounting: Chrome-plated steel, one piece, flat.
  2. Sidewall Mounting: Chrome-plated steel, one piece, flat.
- F. Sprinkler Guards:
1. Standard: UL 199.
  2. Type: Wire cage with fastening device for attaching to sprinkler.
- 2.10 ALARM DEVICES
- A. Alarm-device types shall match piping and equipment connections.
- B. Water-Flow Indicators:
1. Standard: UL 346.
  2. Water-Flow Detector: Electrically supervised.
  3. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
  4. Type: Paddle operated.
  5. Pressure Rating: 250 psig.
  6. Design Installation: Horizontal or vertical.
- C. Valve Supervisory Switches:
1. Standard: UL 346.
  2. Type: Electrically supervised.
  3. Components: Single-pole, double-throw switch with normally closed contacts.
  4. Design: Signals that controlled valve is in other than fully open position.
- 2.11 PRESSURE GAGES
- A. Standard: UL 393.
- B. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- C. Pressure Gage Range: 0 to 250 psig minimum.
- D. Water System Piping Gage: Include "WATER" label on dial face.

## PART 3 - EXECUTION

### 3.1 SERVICE-ENTRANCE PIPING

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Section 211100 "Facility Fire-Suppression Water-Service Piping."

- B. Install shutoff valves with tamper-switches, backflow preventer, pressure gage, drain, flow switches, and other accessories as shown or required by codes and local authorities, at connection to water-service piping. Comply with requirements for backflow preventers in Section 211100 "Facility Fire-Suppression Water-Service Piping."

### 3.2 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
- B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
- C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- E. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- G. Install sprinkler piping with drains for complete system drainage.
- H. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- I. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- J. Install alarm devices, including flow switches on mains and tamper switches on all valves in piping systems.
- K. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- L. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- M. Fill sprinkler system piping with water.
- N. Install electric heating cables and pipe insulation on sprinkler piping in areas subject to freezing. Comply with requirements for heating cables in Section 210533 "Heat Tracing for Fire-Suppression Piping" and for piping insulation in Section 210700 "Fire-Suppression Systems Insulation."
- O. Install sleeves for piping penetrations of walls, ceilings, and floors.

### 3.3 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- 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 pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. 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.



2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
  - H. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
    1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
  - I. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
  - J. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
  - K. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.
- 3.4 VALVE AND SPECIALTIES INSTALLATION
- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
  - B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
  - C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
  - D. Specialty Valves:
    1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
    2. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.
- 3.5 SPRINKLER INSTALLATION
- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.
- 3.6 FIRE-DEPARTMENT CONNECTION INSTALLATION
- A. Install wall-type, fire-department connections.
  - B. Install automatic (ball drip) drain valve at each check valve for fire-department connection.
- 3.7 IDENTIFICATION
- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
  - B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- 3.8 FIELD QUALITY CONTROL
- A. Perform tests and inspections.
  - B. Tests and Inspections:
    1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
    2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
    3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
    4. Energize circuits to electrical equipment and devices.
    5. Coordinate with fire-alarm tests. Operate as required.
    6. Coordinate with fire-pump tests. Operate as required.
    7. Verify that equipment hose threads are same as local fire-department equipment.
  - C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

- D. Prepare test and inspection reports.
- 3.9 CLEANING
- A. Clean dirt and debris from sprinklers.
  - B. Remove and replace sprinklers with paint other than factory finish.
- 3.10 PIPING SCHEDULE
- A. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.
  - B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
  - C. Wet-pipe sprinkler system, NPS 2 and smaller, shall be the following:
    - 1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
  - D. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 6, shall be one of the following:
    - 1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
    - 2. Standard-weight, black-steel pipe with grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
    - 3. Thinwall black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
- 3.11 SPRINKLER SCHEDULE
- A. Use sprinkler types in subparagraphs below for the following applications:
    - 1. Rooms without Ceilings: Upright sprinklers.
    - 2. Rooms with Suspended Ceilings: Flush sprinklers.
    - 3. Wall Mounting: Sidewall sprinklers.
  - B. Provide sprinkler types in subparagraphs below with finishes indicated.
    - 1. Flush Sprinklers: Bright chrome, with painted white escutcheon.
    - 2. Upright Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211313