

SECTION 211313 – WET PIPE SPRINKLER SYSTEMS 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.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipes, fittings, and specialties.
 - 2. Sprinklers.
 - 3. Hangers and supports.
- B. Related Requirements:
 - 1. Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping"
 - 2. Section 210518 "Escutcheons for Fire-Suppression Piping"
 - 3. Section 210553 "Identification for Fire-Suppression Piping and Equipment"

1.3 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings and hydraulic calculations:
 - 1. Include plans, elevations, sections, and attachment details and hydraulic calculations in accordance with NFPA 13 "Plans and Calculations" Chapter. Hydraulic nodes shall be visibly shown on the drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Domestic water piping.
 - 2. HVAC hydronic piping.
 - 3. Items penetrating finished ceiling include the following:

- a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Fire alarm devices.
 - d. Security/communications devices.
 - B. Qualification Data:
 - 1. Qualified Installer
 - 2. Professional engineer or NICET III or IV technician responsible for the preparation of shop drawings, hydraulic calculations, and product data submittal package.
 - C. Design Data:
 - 1. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction.
 - D. Welding certificates.
 - E. Field Test Reports:
 - 1. 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."
 - F. Field quality-control reports.
- 1.6 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.
- 1.7 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Spare sprinklers: furnish no less than two sprinklers of each type provided.
- 1.8 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 not less than one year old from the date of shop drawing submittal.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified NICET III or IV technician or professional engineer.
 - B. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.

- C. All fire protection materials and equipment shall be UL listed and/or FM approved. Valve components (including valve trim, internal parts, gaskets, etc.) and other components as permitted by NFPA 13 shall not be required to be individually listed.
- D. Piping materials shall bear label, stamps, or other markings of specified testing agency.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves and piping according to the following:
 - 1. Ensure that valves and piping are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends and flange faces.
 - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves according to the following:
 - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - 2. Protect from weather, humidity, temperature, dust, dirt, and water damage. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Deliver piping 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.
- D. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- E. Protect flanges, fittings, and specialties from moisture and dirt.

1.10 FIELD CONDITIONS

- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
 - 1. Notify Construction Manager and/or Owner no fewer than three days in advance of proposed interruption of sprinkler service.
 - 2. Do not proceed with interruption of sprinkler service without Construction Manager's and/or Owner's written permission.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13.
- B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- C. Delegated Design: Engage a qualified professional engineer or NICET III or IV technician, as defined in Section 014000 "Quality Requirements," to design wet-pipe sprinkler systems.

1. Refer to fire protection drawings for fire-hydrant flow test records.
 2. Sprinkler system design shall be approved by authorities having jurisdiction.
 - a. Margin of Safety for Available Water Flow and Pressure: 10 psi, including losses through water-service piping, valves, and backflow preventers.
 - b. Sprinkler Occupancy Hazard Classifications:
 - 1) Light Hazard Occupancy: Offices, lobbies, conference rooms, classrooms, restrooms, sleeping rooms, and similar spaces.
 3. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
 4. Maximum Protection Area per Sprinkler: According to UL listing and below.
 - a. Light Hazard Occupancy: 225 sq. ft..
- D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.2 STEEL PIPE AND FITTINGS

- A. Schedule 40, Black-Steel Pipe: ASTM A53 Type E or S.
- B. Malleable- or Ductile-Iron Unions: UL 860.
- C. Cast-Iron Flanges: ASME 16.1, Class 125.
- D. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
1. 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.
- E. Grooved-Joint, Steel-Pipe Appurtenances:
1. Pressure Rating: 175-psig minimum.
 2. 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 SPRINKLER PIPING SPECIALTIES

- A. Branch Outlet Fittings:
1. Standard: UL 213.
 2. Pressure Rating: 175-psig minimum.
 3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
 4. Type: Mechanical-tee and -cross fittings.
 5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
 6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
 7. Branch Outlets: Grooved, plain-end pipe, or threaded.
- B. Adjustable Drop Nipples:
1. Standard: UL 1474.

2. Pressure Rating: 250-psig minimum.
3. Body Material: Steel pipe with EPDM-rubber O-ring seals.
4. Size: Same as connected piping.
5. Length: Adjustable.
6. Inlet and Outlet: Threaded.

2.4 SPRINKLERS

- A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- B. Pressure Rating for Automatic Sprinklers: 175-psig minimum.
- C. Automatic Sprinklers with Heat-Responsive Element:
 1. Nonresidential Applications: UL 199.
 2. Residential Applications: UL 1626.
 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.
- D. Sprinkler Finishes: Chrome plated, bronze, and painted. Refer to sprinkler schedule.
- E. Special Coatings: corrosion-resistant paint. Refer to sprinkler schedule.
- F. 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 or Plastic, white finish, one piece, flat.
- G. Sprinkler Guards:
 1. Standard: UL 199.
 2. Type: Wire cage with fastening device for attaching to sprinkler.

2.5 HANGERS AND SUPPORTS

- A. Hangers and supports for fire suppression piping shall be UL listed or FM approved and installed in accordance with NFPA 13.
- B. Components of hanger assemblies that directly attach to the pipe or to the building structure shall be listed unless the following requirements are met:
 1. Mild steel hanger rods and hangers formed from mild steel rods shall be permitted to be not listed.
 2. Fasteners in concrete, steel, or, wood in accordance with NFPA 13.
- C. Use carbon-steel pipe hangers and supports for general service applications.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
 - 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.
 - 2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.
- C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.
- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- F. Install sprinkler piping with drains for complete system drainage. Where low points cannot be avoided, auxiliary drains shall be provided in accordance with NFPA 13.
- G. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- H. Fill sprinkler system piping with water.
- I. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- J. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.2 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. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- D. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

- E. 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.

3.3 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.

3.4 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."

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Where modifications affect less than 20 sprinklers, the new portion may be tested at system working pressure and shall maintain that pressure without loss for 2 hours. 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. Main drain valve test shall be performed, and the resulting static and residual pressure recorded in accordance with NFPA 13.
 - 5. Energize circuits to electrical equipment and devices.
 - 6. Coordinate with fire-alarm tests. Operate as required.
 - 7. Coordinate with fire-pump tests. Operate as required.
 - 8. Verify that equipment hose threads are same as local fire department equipment.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.6 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.7 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain installed sprinkler system.

3.8 PIPING SCHEDULE

- A. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- B. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, 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 roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - 3. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.

3.9 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
 - 1. Match existing sprinkler type and rating.
 - 2. Rooms without Ceilings: Upright sprinklers.
 - 3. Rooms with Suspended Ceilings: Recessed sprinklers.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
 - 1. Match existing sprinkler type and finish

END OF SECTION