

**SECTION 21 13 13**  
**WET-PIPE SPRINKLER SYSTEMS**

**PART 1 - GENERAL**

**1.1 STIPULATIONS**

- A. The specifications sections "General Conditions to the Construction Contract", "Special Conditions" and "Division 01 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Steel pipe and fittings.
  - 2. Specialty valves.
  - 3. Air vent.
  - 4. Sprinkler piping specialties.
  - 5. Sprinklers.
  - 6. Alarm devices.
  - 7. Pressure gauges.

**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: For wet-pipe sprinkler systems.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include diagrams for power, signal, and control wiring.
- C. Delegated Design Submittal: For wet-pipe 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.

## **1.5 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Sprinkler systems, or BIM model, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved.
- B. Qualification Data: For qualified Installer and professional engineer.
- C. Design Data:
  - 1. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- 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."
  - 2. Fire-hydrant flow test report.
- 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. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

## **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.
    - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

- B. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.

## **1.9 FIELD CONDITIONS**

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

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. 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.
- B. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with NFPA 13.
- C. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- D. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design wet-pipe sprinkler systems.
  - 1. Available fire-hydrant flow test records indicate the following conditions:
    - a. Date: Friday, August 12/2022.
    - b. Time: 9:20a.m.
    - c. Performed by: Irvin Smith & Cole Westover of Triangle Fire Protection, Inc
    - d. Location of Residual Fire Hydrant R: FH#12 Roadside near Bldg #21 - Est Elev 635'±.
    - e. Location of Flow Fire Hydrant F: FH#2 Roadside near Bldg #10 - Est Elev 623'±..
    - f. Static Pressure at Residual Fire Hydrant R: 59 psig
    - g. Measured Flow at Flow Fire Hydrant F: 1286 gpm
    - h. Residual Pressure at Residual Fire Hydrant R: 55 psig
  - 2. Sprinkler system design shall be approved by authorities having jurisdiction.
    - a. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
    - b. Sprinkler Occupancy Hazard Classifications:
      - 1) Building Service Areas: Ordinary Hazard, Group 1.
      - 2) Electrical Equipment Rooms: Ordinary Hazard, Group 1.
      - 3) General Storage Areas: Ordinary Hazard, Group 1.
      - 4) Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
      - 5) Office and Public Areas: Light Hazard.

- 6) Residential Living Areas: Light Hazard.
3. Minimum Density for Automatic-Sprinkler Piping Design:
    - a. Residential (Dwelling) Occupancy: 0.05 gpm over 400-sq. ft. area.
    - b. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
    - c. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
    - d. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
    - e. Extra-Hazard, Group 1 Occupancy: 0.30 gpm over 2500-sq. ft. area.
    - f. Special Occupancy Hazard: As determined by authorities having jurisdiction.
  4. Minimum Density for Deluge-Sprinkler Piping Design:
    - a. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over entire area.
    - b. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over entire area.
    - c. Extra-Hazard, Group 1 Occupancy: 0.30 gpm over entire area.
    - d. Special Occupancy Hazard: As determined by authorities having jurisdiction.
  5. Maximum protection area per sprinkler according to UL listing.
  6. Maximum Protection Area per Sprinkler:
    - a. Residential Areas: 400 sq. ft..
    - b. Office Spaces: 225 sq. ft..
    - c. Storage Areas: 130 sq. ft..
    - d. Mechanical Equipment Rooms: 130 sq. ft..
    - e. Electrical Equipment Rooms: 130 sq. ft..
    - f. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.

## 2.2 STEEL PIPE AND FITTINGS

- A. Standard-Weight, Black-Steel Pipe: ASTM A53/A53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.
- B. Schedule 30, Black-Steel Pipe: ASTM A135/A135M; ASTM A795/A795M, Type E; or ASME B36.10M wrought steel, with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.
- C. Black-Steel Pipe Nipples: ASTM A733, made of ASTM A53/A53M, standard-weight, seamless steel pipe with threaded ends.
- D. Steel Couplings: ASTM A865/A865M, threaded.
- E. Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
  1. Metal, Pipe-Flange Bolts and Nuts: Carbon steel unless otherwise indicated.
- F. Steel Welding Fittings: ASTM A234/A234M 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.

G. Grooved-Joint, Steel-Pipe Appurtenances:

1. 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:
  - a. Anvil International/Smith-Cooper International; Tailwind Capital, LLC.
  - b. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
  - c. Victaulic Company.
  - d. Or equal as approved by the Professional.
2. Pressure Rating: 175-psig minimum.
3. Grooved-End Fittings for Steel Piping: ASTM A47/A47M, malleable-iron casting or ASTM A536, ductile-iron casting, with dimensions matching steel pipe.
4. 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 SPECIALTY VALVES**

- A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- B. Pressure Rating:
  1. Standard-Pressure Piping Specialty Valves: 175-psig minimum.
- C. Body Material: Cast or ductile iron.
- D. Size: Same as connected piping.
- E. End Connections: Flanged or grooved.
- F. Automatic (Ball Drip) Drain Valves:
  1. 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:
    - a. Reliable Automatic Sprinkler Co., Inc. (The).
    - b. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
    - c. Or equal as approved by the Professional.
  2. Standard: UL 1726.
  3. Pressure Rating: 175-psig minimum.
  4. Type: Automatic draining, ball check.
  5. Size: NPS 3/4.
  6. End Connections: Threaded.

## 2.4 BACKFLOW PREVENTERS

### A. Double Detector-Check, Backflow-Prevention Assemblies:

1. 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:
  - a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
  - b. WATTS.
  - c. Zurn Industries, LLC.
  - d. Or equal as approved by the Professional.
2. Standards: ASSE 1015. UL classified and FM approved. ASSE 1048 / AWWA C510
3. Operation: Continuous-pressure applications unless otherwise indicated.
4. Pressure Loss: 5 psig maximum, through middle third of flow range.
5. Size: 6 NPS.
6. Design Flow Rate: 500 gpm.
7. Selected Unit Flow Range Limits: 1000 gpm / 1500 gpm.
8. Pressure Loss at Design Flow Rate: 7 psig for NPS 6.
10. Body: ductile or cast iron with interior lining that complies with AWWA C550 or that is FDA approved or stainless steel for NPS 2-1/2 and larger.
11. End Connections: Flanged for NPS 2-1/2 and larger.
12. Configuration: Designed for horizontal, straight-through flow.
13. Source Limitations: Obtain detector check valves from single manufacturer.
14. Description: Include threaded bypass taps in inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.
15. Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.
16. Detector Type Water Meter, Remote Registration System, Encoder Type: Utility company standard. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.
  - a. Standard: AWWA C707.
  - b. Registration: Flow in gallons / cubic feet.
  - c. Pressure Rating: 175 psig.
17. Basis of Design: Watts - Series 709DCDA 8" Double Check Detector Assembly.
18. Accessories:
  - a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
  - b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
  - c. Auxiliary detector bypass line shall consist of an approved backflow preventer, ball type test valves and bronze detector meter assembly (5/8" x 3/4").

## 2.5 AIR VENT

### A. Automatic Air Vent:

1. 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:
  - a. AGF Manufacturing, Inc.
  - b. Engineered Corrosion Solutions.
  - c. Val-Matic Valve & Manufacturing Corp.
  - d. Or equal as approved by the Professional.
2. Description: Automatic air vent that automatically vents trapped air without human intervention.
3. Standard: UL listed or FM Global approved for use in wet-pipe fire sprinkler systems.
4. Vents oxygen continuously from system.
5. Float valve to prevent water discharge.
6. Minimum Water Working Pressure Rating: 175 psig.

B. Automatic Air Vent Assembly:

1. 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:
  - a. AGF Manufacturing, Inc.
  - b. Engineered Corrosion Solutions.
  - c. Potter Electric Signal Company, LLC.
  - d. Or equal as approved by the Professional.
2. Description: Automatic dual air vent assembly that automatically vents trapped air without human intervention, including Y-strainer and ball valve in a pre-piped assembly.
3. Standard: UL listed or FM Global approved for use in wet-pipe fire sprinkler system.
4. Vents oxygen continuously from system.
5. Float valve to prevent water discharge.
6. Minimum Water Working Pressure Rating: 175 psig.

## 2.6 SPRINKLER PIPING SPECIALTIES

A. Branch Outlet Fittings:

1. 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:
  - a. AGF Manufacturing, Inc.
  - b. Anvil International/Smith-Cooper International; Tailwind Capital, LLC.
  - c. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
  - d. Victaulic Company.
  - e. Or equal as approved by the Professional.
2. Standard: UL 213.
3. Pressure Rating: 175-psig minimum.
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-tee and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.

7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:

1. 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:
  - a. AGF Manufacturing, Inc.
  - b. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
  - c. Victaulic Company.
  - d. Or equal as approved by the Professional.
2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: 175-psig minimum.
4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded or grooved.

C. Branch Line Testers:

1. 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:
  - a. AGF Manufacturing, Inc.
  - b. Elkhart Brass Mfg. Co., Inc.
  - c. Fire-End & Croker Corporation.
  - d. Potter Roemer LLC; a Division of Morris Group International.
  - e. Or equal as approved by the Professional.
2. Standard: UL 199.
3. Pressure Rating: 175 psig.
4. Body Material: Brass.
5. Size: Same as connected piping.
6. Inlet: Threaded.
7. Drain Outlet: Threaded and capped.
8. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. 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:
  - a. AGF Manufacturing, Inc.
  - b. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
  - c. Victaulic Company.
  - d. Viking Group Inc.
  - e. Or equal as approved by the Professional.



2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: 175-psig minimum.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. 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:
  - a. Aegis Technologies, Inc.
  - b. CPS Products, Inc.
  - c. Merit Manufacturing.
  - d. Or equal as approved by the Professional.
2. Standard: UL 1474.
3. Pressure Rating: 250-psig minimum.
4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

F. Flexible Sprinkler Hose Fittings:

1. 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:
  - a. ALEUM USA.
  - b. FlexHead Industries, Inc.
  - c. Victaulic Company.
  - d. Or equal as approved by the Professional.
2. Standard: UL 1474.
3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
4. Pressure Rating: 175-psig minimum.
5. Size: Same as connected piping, for sprinkler.

## 2.7 SPRINKLERS

- A. Project Conditions and Application: Refer Fire Sprinkler Demand Schedule on Drawing FP-001 for designated Area and Room requirements and fire sprinkler type and requirements.
  1. The rooms and areas accessible to the Residents shall be Institutional type, tamper-resistant (ligature resistant) sprinklers.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Globe Fire Sprinkler Corporation.
  2. Reliable Automatic Sprinkler Co., Inc. (The).

3. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
  4. Victaulic Company.
  5. Viking Group Inc.
  6. Or equal as approved by the Professional.
- C. Institutional sprinklers: Flush-mount, tamper-resistant, pendent or horizontal sidewall quick-response, extended or standard coverage sprinklers. K-Factor 5.6 at 165°F.
1. Basis of Design: Viking - Institutional Sprinkler K5.6 - Model # VK425, VK427 or approved equal.
- D. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- E. Pressure Rating for Residential Sprinklers: 175-psig maximum.
- F. Pressure Rating for Automatic Sprinklers: 175-psig minimum.
- G. Automatic Sprinklers with Heat-Responsive Element:
1. Early-Suppression, Fast-Response Applications: UL 1767.
  2. Nonresidential Applications: UL 199.
  3. Residential Applications: UL 1626.
- H. Sprinkler Finishes: Chrome plated bronze and painted.
- I. Special Coatings: Wax and corrosion-resistant paint.
- J. 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 or flat Chrome-plated steel, two piece, with 1-inch vertical adjustment.
  2. Sidewall Mounting: Chrome-plated steel, one piece, flat.
- K. Sprinkler Guards:
1. 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:
    - a. Reliable Automatic Sprinkler Co., Inc. (The).
    - b. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
    - c. Victaulic Company.
    - d. Viking Group Inc.
    - e. Or equal as approved by the Professional.
  2. Standard: UL 199.
  3. Type: Wire cage with fastening device for attaching to sprinkler.

## 2.8 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.
- B. Water-Flow Indicators:
  - 1. 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:
    - a. ADT Security Services, Inc.
    - b. Potter Electric Signal Company, LLC.
    - c. Viking Group Inc.
    - d. WATTS; A Watts Water Technologies Company.
    - e. Or equal as approved by the Professional.
  - 2. Standard: UL 346.
  - 3. Water-Flow Detector: Electrically supervised.
  - 4. 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.
  - 5. Type: Paddle operated.
  - 6. Pressure Rating: 250 psig.
  - 7. Design Installation: Horizontal or vertical.
- C. Pressure Switches:
  - 1. 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:
    - a. Potter Electric Signal Company, LLC.
    - b. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
    - c. Viking Group Inc.
    - d. Or equal as approved by the Professional.
  - 2. Standard: UL 346.
  - 3. Type: Electrically supervised water-flow switch with retard feature.
  - 4. Components: Single-pole, double-throw switch with normally closed contacts.
  - 5. Design Operation: Rising pressure signals water flow.
- D. Valve Supervisory Switches:
  - 1. 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:
    - a. Fire-Lite Alarms; Honeywell International, Inc.
    - b. Kennedy Valve Company; a division of McWane, Inc.
    - c. Potter Electric Signal Company, LLC.
    - d. Or equal as approved by the Professional.
  - 2. Standard: UL 346.

3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.
6. 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.

## **2.9 PRESSURE GAUGES**

- 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. AGF Manufacturing, Inc.
  2. AMETEK, Inc.
  3. Ashcroft Inc.
  4. WIKA Instrument Corporation.
  5. Or equal as approved by the Professional.
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- D. Pressure Gauge Range: 0- to 250-psig minimum.
- E. Label: Include "WATER" label on dial face.

## **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.
- B. Report test results promptly and in writing.

### **3.2 SERVICE-ENTRANCE PIPING**

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Section 331415 "Site Water Distribution Piping" for exterior piping.
- B. Install shutoff valve, backflow preventer, pressure gauge, drain, and other accessories indicated at connection to water-service piping.
- C. Install shutoff valve, check valve, pressure gauge, and drain at connection to water service.

### **3.3 WATER-SUPPLY CONNECTIONS**

- A. Install shutoff valve, backflow preventer, pressure gauge, drain, and other accessories indicated at connection to water-distribution piping.

- B. Install shutoff valve, check valve, pressure gauge, and drain at connection to water supply.

### **3.4 INSTALLATION OF PIPING**

- 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. 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 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. In seismic-rated areas, refer to Section 210548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."
- L. Install pressure gauges on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gauges with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and install where they are not subject to freezing.
- M. Fill sprinkler system piping with water.
- N. 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."
- O. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

- P. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

### **3.5 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.

### **3.6 INSTALLATION OF VALVES AND SPECIALTIES**

- 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. Install valves in vertical position for proper direction of flow, in main supply to system.
  - 2. Install alarm valves with bypass check valve and retarding chamber drain-line connection.
  - 3. Install deluge valves in vertical position, in proper direction of flow, and in main supply to deluge system. Install trim sets for drain, priming level, alarm connections, ball drip valves, pressure gauges, priming chamber attachment, and fill-line attachment.
- E. Air Vent:
  - 1. Provide at least one air vent at high point in each wet-pipe sprinkler system in accordance with NFPA 13 requirements. Connect vent into top of fire sprinkler piping.
  - 2. Provide dielectric union for dissimilar metals, ball valve, and strainer upstream of automatic air vent.
  - 3. Pipe from outlet of air vent to drain.

### **3.7 INSTALLATION OF SPRINKLERS**

- A. Install sprinklers in suspended ceilings in center of [ **narrow dimension of** ] acoustical ceiling panels.
- B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
- C. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

### **3.8 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."

### **3.9 FIELD QUALITY CONTROL**

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 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.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### **3.10 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.

### **3.11 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Client Agency's maintenance personnel to adjust, operate, and maintain specialty valves.

### **3.12 PIPING SCHEDULE**

- A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends, cast-iron threaded fittings, and threaded or 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. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, shall be the following:
1. Standard-weight or Schedule 30, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
  2. Standard-weight or Schedule 30, black-steel pipe with cut-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
  3. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
- D. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 4, shall be[ **one of**] the following:
1. Standard-weight or Schedule 30, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
  2. Standard-weight or Schedule 30, black-steel pipe with cut-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
  3. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.



- E. Standard-pressure, wet-pipe sprinkler system, NPS 5 and larger, shall be the following:
1. Standard-weight or Schedule 30, black-steel pipe with cut-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
  2. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.

### **3.13 SPRINKLER SCHEDULE**

- A. Use sprinkler types in subparagraphs below for the following applications:
1. Rooms without Ceilings: Institutional Upright sprinklers.
  2. Rooms with Suspended Ceilings: Institutional Pendent, recessed, flush, and concealed sprinklers as indicated.
  3. Wall Mounting: Sidewall sprinklers.
  4. Spaces Subject to Freezing: Upright, pendent, dry sprinklers; and sidewall, dry sprinklers as indicated.
  5. Special Applications: Extended-coverage, flow-control, and quick-response sprinklers where indicated, Attic sprinklers and Institutional space sprinklers.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
  2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
  3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
  4. Residential Sprinklers: Dull chrome.
  5. 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**