

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. Section Includes:

- 1. Pipes, fittings, and specialties.
- 2. Fire-protection valves.
- 3. Fire-department connections.
- 4. Sprinkler specialty pipe fittings.
- 5. Sprinklers.
- 6. Alarm devices.
- 7. Manual control stations.
- 8. Control panels.
- 9. Pressure gages.

- B. Related Sections:

- 1. Division 21 Section "Fire-Suppression Standpipes" for standpipe piping.
- 2. Division 21 Section "Wet-Pipe Sprinkler Systems" for wet-pipe sprinkler piping.
- 3. Division 21 Section "Electric-Drive, Centrifugal Fire Pumps" for fire pumps, pressure-maintenance pumps, and fire-pump controllers.
- 4. Division 28 Section "Digital, Addressable Fire-Alarm System" for alarm devices not specified in this Section.

**1.03 DEFINITIONS**

- A. Standard-Pressure Sprinkler Piping: Dry-pipe sprinkler system piping designed to operate at working pressure 175 psig (1200 kPa) maximum.

**1.04 SYSTEM DESCRIPTIONS**

- A. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from sprinklers that are open.
- B. Single-Interlock Preaction Sprinkler System: Automatic sprinklers are attached to piping containing low-pressure air. Actuation of fire-detection system in same area as sprinklers opens deluge valve, permitting water to flow into piping and to discharge from sprinklers that have opened.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 2**

**1.05 PERFORMANCE REQUIREMENTS**

- A. Standard-Pressure Piping System Component: Listed for 175-psig (1200-kPa) minimum working pressure.
- B. Sprinkler system design shall be approved by authorities having jurisdiction.
  - 1. Margin of Safety for Available Water Flow and Pressure: 20 percent, including losses through water-service piping, valves, and backflow preventers.
  - 2. Sprinkler Occupancy Hazard Classifications:
    - a. Per NFPA 13 and 13R.
  - 3. Minimum Density for Automatic-Sprinkler Piping Design:
    - a. Per NFPA 13 and 13R
  - 4. Maximum Protection Area per Sprinkler: Per UL listing.
  - 5. Maximum Protection Area per Sprinkler:
    - a. Per NFPA 13 recommendations unless otherwise indicated.
  - 6. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 and 13R unless otherwise indicated:
    - a. Per NFPA 13 and 13R.
- C. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

**1.06 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For dry-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. 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. Compressed air piping.
  - 3. HVAC hydronic piping and ductwork.
  - 4. Items penetrating finished ceiling including the following:
    - a. Lighting fixtures.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 3**

- b. Air outlets and inlets.
  - c. Mill work.
5. Soffits and Sky Lights.
- E. Qualification Data: For qualified Installer and professional engineer.
- F. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- G. Fire-hydrant flow test report.
- H. 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."
- I. Field quality-control reports.
- J. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

**1.07 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 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height."
  - 3. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."

**1.08 PROJECT 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:

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 4**

1. Notify Construction Manager and Owner no fewer than two days in advance of proposed interruption of sprinkler service.
2. Do not proceed with interruption of sprinkler service without Construction Manager's and Owner's written permission.

**1.09 COORDINATION**

- A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

**1.10 EXTRA MATERIALS**

- 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.

**PART 2 - PRODUCTS**

**2.01 PIPING MATERIALS**

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

**2.02 STEEL PIPE AND FITTINGS**

- A. Standard Weight, Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.
- B. Schedule 30, Galvanized-Steel Pipe: ASTM A 135; ASTM A 795/A 795M, 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. Thinwall Galvanized-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.
- D. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- E. Galvanized, Steel Couplings: ASTM A 865, threaded.
- F. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 5**

- G. Malleable- or Ductile-Iron Unions: UL 860.
- H. Cast-Iron Flanges: ASME B16.1, Class 125.
- I. Plain-End-Pipe Fittings: UL 213, ductile-iron body with retainer lugs that require one-quarter turn or screwed retainer pin to secure pipe in fitting.
  - 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, Inc.
    - b. Shurjoint Piping Products.
- J. 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, Inc.
    - b. Corcoran Piping System Co.
    - c. National Fittings, Inc.
    - d. Shurjoint Piping Products.
    - e. Tyco Fire & Building Products LP.
    - f. Victaulic Company.
  - 2. Pressure Rating: 250 psig (1725 kPa) minimum.
  - 3. Galvanized, 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.
  - 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.

**2.03 PIPING JOINING MATERIALS**

- A. Pipe-Flange Gasket Materials: WWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free.
  - 1. Class 125, Cast-Iron and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
  - 2. Class 250, Cast-Iron and Class 300, Raised-Face Flanges: Ring-type gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

**2.04 LISTED FIRE-PROTECTION VALVES**

A. General Requirements:

1. Valves shall be UL listed or FM approved.
2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig (1200 kPa).

B. Ball 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Anvil International, Inc.
  - b. Victaulic Company.
3. Standard: UL 1091 except with ball instead of disc.
4. Valves NPS 1-1/2 (DN 40) and Smaller: Bronze body with threaded ends.
5. Valves NPS 2 and NPS 2-1/2 (DN 50 and DN 65): Bronze body with threaded ends or ductile-iron body with grooved ends.
6. Valves NPS 3 (DN 80): Ductile-iron body with grooved ends.

C. Bronze Butterfly 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Fivalco Inc.
  - b. Global Safety Products, Inc.
  - c. Milwaukee Valve Company.
3. Standard: UL 1091.
4. Pressure Rating: 175 psig (1200 kPa).
5. Body Material: Bronze.
6. End Connections: Threaded.

D. Iron Butterfly 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Anvil International, Inc.
  - b. Fivalco Inc.
  - c. Global Safety Products, Inc.
  - d. Kennedy Valve; a division of McWane, Inc.
  - e. Milwaukee Valve Company.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 7**

- f. NIBCO INC.
  - g. Pratt, Henry Company.
  - h. Shurjoint Piping Products.
  - i. Tyco Fire & Building Products LP.
  - j. Victaulic Company.
- 
- 3. Standard: UL 1091.
  - 4. Pressure Rating: 175 psig (1200 kPa).
  - 5. Body Material: Cast or ductile iron.
  - 6. Style: Lug or wafer.
  - 7. End Connections: Grooved.

**E. Check 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:
- 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. AFAC Inc.
  - b. American Cast Iron Pipe Company; Waterous Company Subsidiary.
  - c. Anvil International, Inc.
  - d. Clow Valve Company; a division of McWane, Inc.
  - e. Crane Co.; Crane Valve Group; Crane Valves.
  - f. Crane Co.; Crane Valve Group; Jenkins Valves.
  - g. Crane Co.; Crane Valve Group; Stockham Division.
  - h. Fire-End & Croker Corporation.
  - i. Fire Protection Products, Inc.
  - j. Fivalco Inc.
  - k. Globe Fire Sprinkler Corporation.
  - l. Groeniger & Company.
  - m. Kennedy Valve; a division of McWane, Inc.
  - n. Matco-Norca.
  - o. Metraflex, Inc.
  - p. Milwaukee Valve Company.
  - q. Mueller Co.; Water Products Division.
  - r. NIBCO INC.
  - s. Potter Roemer.
  - t. Reliable Automatic Sprinkler Co., Inc.
  - u. Shurjoint Piping Products.
  - v. Tyco Fire & Building Products LP.
  - w. United Brass Works, Inc.
  - x. Venus Fire Protection Ltd.
  - y. Victaulic Company.
  - z. Viking Corporation.
- 3. Standard: UL 312
- 4. Pressure Rating: 250 psig (1725 kPa) minimum.
- 5. Type: Swing check.
- 6. Body Material: Cast iron.
- 7. End Connections: Flanged or grooved.

**F. Bronze OS&Y Gate Valves:**

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 8**

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:
  2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. Crane Co.; Crane Valve Group; Crane Valves.
    - b. Crane Co.; Crane Valve Group; Stockham Division.
    - c. Milwaukee Valve Company.
    - d. NIBCO INC.
    - e. United Brass Works, Inc.
  3. Standard: UL 262.
  4. Pressure Rating: 175 psig (1200 kPa).
  5. Body Material: Bronze.
  6. End Connections: Threaded.
- G. Iron OS&Y Gate 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:
  2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
    - b. American Valve, Inc.
    - c. Clow Valve Company; a division of McWane, Inc.
    - d. Crane Co.; Crane Valve Group; Crane Valves.
    - e. Crane Co.; Crane Valve Group; Jenkins Valves.
    - f. Crane Co.; Crane Valve Group; Stockham Division.
    - g. Hammond Valve.
    - h. Milwaukee Valve Company.
    - i. Mueller Co.; Water Products Division.
    - j. NIBCO INC.
    - k. Shurjoint Piping Products.
    - l. Tyco Fire & Building Products LP.
    - m. United Brass Works, Inc.
    - n. Watts Water Technologies, Inc.
  3. Standard: UL 262.
  4. Pressure Rating: 250 psig (1725 kPa) minimum.
  5. Body Material: Cast or ductile iron.
  6. End Connections: Flanged or grooved.
- H. Indicating-Type Butterfly 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:
  2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
    - a. Anvil International, Inc.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 9**

- b. Fivalco Inc.
  - c. Global Safety Products, Inc.
  - d. Kennedy Valve; a division of McWane, Inc.
  - e. Milwaukee Valve Company.
  - f. NIBCO INC.
  - g. Shurjoint Piping Products.
  - h. Tyco Fire & Building Products LP.
  - i. Victaulic Company.
- 3. Standard: UL 1091.
  - 4. Pressure Rating: 175 psig (1200 kPa) minimum.
  - 5. Valves NPS 2 (DN 50) and Smaller:
    - a. Valve Type: Ball or butterfly.
    - b. Body Material: Bronze.
    - c. End Connections: Threaded.
  - 6. Valves NPS 2-1/2 (DN 65) and Larger:
    - a. Valve Type: Butterfly.
    - b. Body Material: Cast or ductile iron.
    - c. End Connections: Flanged, grooved, or wafer.
  - 7. Valve Operation: Integral electrical, 115-V ac, prewired, two-circuit, supervisory switch indicating device.
- I. NRS Gate 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:
  - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
    - b. American Valve, Inc.
    - c. Clow Valve Company; a division of McWane, Inc.
    - d. Crane Co.; Crane Valve Group; Stockham Division.
    - e. Kennedy Valve; a division of McWane, Inc.
    - f. Mueller Co.; Water Products Division.
    - g. NIBCO INC.
    - h. Tyco Fire & Building Products LP.
  - 3. Standard: UL 262.
  - 4. Pressure Rating: 250 psig (1725 kPa) minimum.
  - 5. Body Material: Cast iron with indicator post flange.
  - 6. Stem: Nonrising.
  - 7. End Connections: Flanged or grooved.

**2.05 TRIM AND DRAIN VALVES**

- A. General Requirements:

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 10**

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig (1200 kPa) minimum.

**B. Angle 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. Fire Protection Products, Inc.
  - b. United Brass Works, Inc.

**C. Ball 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. Affiliated Distributors.
  - b. Anvil International, Inc.
  - c. Barnett.
  - d. Conbraco Industries, Inc.; Apollo Valves.
  - e. Fire-End & Croker Corporation.
  - f. Fire Protection Products, Inc.
  - g. Flowserve.
  - h. FNW.
  - i. Jomar International, Ltd.
  - j. Kennedy Valve; a division of McWane, Inc.
  - k. Kitz Corporation.
  - l. Legend Valve.
  - m. Metso Automation USA Inc.
  - n. Milwaukee Valve Company.
  - o. NIBCO INC.
  - p. Potter Roemer.
  - q. Red-White Valve Corporation.
  - r. Southern Manufacturing Group.
  - s. Stewart, M. A. and Sons Ltd.
  - t. Tyco Fire & Building Products LP.
  - u. Victaulic Company.
  - v. Watts Water Technologies, Inc.

**D. Globe 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. Fire Protection Products, Inc.
  - b. United Brass Works, Inc.

**E. Plug Valves:**

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 11**

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. Southern Manufacturing Group.

**2.06 SPECIALTY VALVES**

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating:
  - a. Standard-Pressure Piping Specialty Valves: 175 psig (1200 kPa) minimum.
  - b. High-Pressure Piping Specialty Valves: 250 psig (1725 kPa) minimum.
3. Body Material: Cast or ductile iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

B. Dry-Pipe 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. AFAC Inc.
  - b. Globe Fire Sprinkler Corporation.
  - c. Reliable Automatic Sprinkler Co., Inc.
  - d. Tyco Fire & Building Products LP.
  - e. Venus Fire Protection Ltd.
  - f. Victaulic Company.
  - g. Viking Corporation.
3. Standard: UL 260
4. Design: Differential-pressure type.
5. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
6. Air-Pressure Maintenance Device:
  - 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:
  - b. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - 1) AFAC Inc.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 12**

- 2) Globe Fire Sprinkler Corporation.
- 3) Reliable Automatic Sprinkler Co., Inc.
- 4) Tyco Fire & Building Products LP.
- 5) Venus Fire Protection Ltd.
- 6) Victaulic Company.
- 7) Viking Corporation.

- c. Standard: UL 260.
- d. Type: Automatic device to maintain minimum air pressure in piping.
- e. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig (95- to 410-kPa) adjustable range, and 300-psig (2070-kPa) outlet pressure.

7. Air Compressor:

- a. Manufacturers: Subject to compliance with requirements,
- b. available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- c. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1) Gast Manufacturing Inc.
  - 2) General Air Products, Inc,
  - 3) Viking Corporation.
- d. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
- e. Motor Horsepower: Fractional.
- f. Power: 120-V ac, 60 Hz, single phase.

C. Deluge 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. AFAC Inc.
  - b. BERMAD Control Valves.
  - c. CLA-VAL Automatic Control Valves.
  - d. Globe Fire Sprinkler Corporation.
  - e. OCV Control Valves.
  - f. Reliable Automatic Sprinkler Co., Inc.
  - g. Tyco Fire & Building Products LP.
  - h. Venus Fire Protection Ltd.
  - i. Victaulic Company.
  - j. Viking Corporation.
3. Standard: UL 260.
4. Design: Hydraulically operated, differential-pressure type.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 13**

5. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, drip cup assembly piped without valves and separate from main drain line, fill-line attachment with strainer, and push-rod chamber supply connection.
6. Dry, Pilot-Line Trim Set: Include dry, pilot-line actuator; air- and water-pressure gages; low-air-pressure warning switch; air relief valve; and actuation device. Dry, pilot-line actuator includes cast-iron, operated, diaphragm-type valve with resilient facing plate, resilient diaphragm, and replaceable bronze seat. Valve includes threaded water and air inlets and water outlet. Loss of air pressure on dry, pilot-line side allows pilot-line actuator to open and causes deluge valve to open immediately.
7. Air-Pressure Maintenance Device:
  - 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:
  - b. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - 1) AFAC Inc.
    - 2) Globe Fire Sprinkler Corporation.
    - 3) Reliable Automatic Sprinkler Co., Inc.
    - 4) Tyco Fire & Building Products LP.
    - 5) Venus Fire Protection Ltd.
    - 6) Victaulic Company.
    - 7) Viking Corporation.
  - a. Standard: UL 260.
  - b. Type: Automatic device to maintain minimum air pressure in piping.
  - c. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig (95- to 410-kPa) adjustable range, and 300-psig (2070-kPa) outlet pressure.
8. Air Compressor:
  - 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:
  - b. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - 1) Gast Manufacturing Inc.
    - 2) General Air Products, Inc,
    - 3) Viking Corporation.
  - c. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
  - d. Motor Horsepower: Fractional.
  - e. Power: 120-V ac, 60 Hz, single phase.
- D. Automatic (Ball Drip) Drain Valves:

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 14**

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. AFAC Inc.
  - b. Reliable Automatic Sprinkler Co., Inc.
  - c. Tyco Fire & Building Products LP.
3. Standard: UL 1726.
4. Pressure Rating: 175 psig (1200 kPa) minimum.
5. Type: Automatic draining, ball check.
6. Size: NPS 3/4 (DN 20).
7. End Connections: Threaded.

**2.07 FIRE-DEPARTMENT CONNECTIONS**

A. Exposed-Type, Fire-Department Connection:

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. AFAC Inc.
  - b. Elkhart Brass Mfg. Company, Inc.
  - c. Fire-End & Croker Corporation.
  - d. Fire Protection Products, Inc.
  - e. GMR International Equipment Corporation.
  - f. Guardian Fire Equipment, Inc.
  - g. Tyco Fire & Building Products LP.
  - h. Wilson & Cousins Inc.
3. Standard: UL 405.
4. Type: Exposed, projecting, for wall mounting.
5. Pressure Rating: 175 psig (1200 kPa) minimum.
6. Body Material: Corrosion-resistant metal.
7. 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.
8. Caps: Brass, lugged type, with gasket and chain.
9. Escutcheon Plate: Round, brass, wall type.
10. Outlet: Back, with pipe threads.
11. Number of Inlets: Two.
12. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE."
13. Finish: Polished chrome plated.
14. Outlet Size: NPS 6 (DN 150).

**2.08 SPRINKLER SPECIALTY PIPE FITTINGS**

- A. General Requirements for Dry-Pipe-System Fittings: UL listed for dry-pipe service.
  
- B. 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. Anvil International, Inc.
    - b. National Fittings, Inc.
    - c. Shurjoint Piping Products.
    - d. Tyco Fire & Building Products LP.
    - e. Victaulic Company.
  - 2. Standard: UL 213.
  - 3. Pressure Rating: 300 psig (2070 kPa).
  - 4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
  - 5. Type: Mechanical-T 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.
  
- C. 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. Reliable Automatic Sprinkler Co., Inc.
    - c. Tyco Fire & Building Products LP.
    - d. Victaulic Company.
    - e. .
  - 2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
  - 3. Pressure Rating: 300 psig (2070 kPa).
  - 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.
  
- D. 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. Elkhart Brass Mfg. Company, Inc.
    - b. Fire-End & Croker Corporation.
    - c. Potter Roemer.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 16**

2. Standard: UL 199.
3. Pressure Rating: 175 psig (1200 kPa) minimum.
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.

**E. 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. Triple R Specialty.
  - c. Tyco Fire & Building Products LP.
  - d. Victaulic Company.
  - e. Viking Corporation.
2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 300 psig (2070 kPa).
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

**F. 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. CECA, LLC.
  - b. Corcoran Piping System Co.
  - c. Merit Manufacturing; a division of Anvil International, Inc.
2. Standard: UL 1474.
3. Pressure Rating: 300 psig (2070 kPa).
4. Body Material: Steel pipe with EPDM O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

**G. 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. Fivalco Inc.
  - b. FlexHead Industries, Inc.
  - c. Gateway Tubing, Inc.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 17**

2. Standard: UL 1474.
3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
4. Pressure Rating: 300 psig (2070 kPa).
5. Size: Same as connected piping, for sprinkler.

**2.09 SPRINKLERS**

- 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. AFAC Inc.
  2. Globe Fire Sprinkler Corporation.
  3. Reliable Automatic Sprinkler Co., Inc.
  4. Tyco Fire & Building Products LP.
  5. Venus Fire Protection Ltd.
  6. Victaulic Company.
  7. Viking Corporation.
- B. 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 (1200 kPa) maximum.
  3. Pressure Rating for Automatic Sprinklers: 175 psig (1200 kPa) minimum.
  4. Pressure Rating for High-Pressure Automatic Sprinklers: 300 psig (2070 kPa).
- C. Automatic Sprinklers with Heat-Responsive Element:
1. Nonresidential Applications: UL 199.
  2. Residential Applications: UL 1626.
  3. Characteristics: Nominal 1/2-inch (12.7-mm) orifice with discharge coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
- D. Sprinkler Finishes:
1. Chrome plated.
  2. Bronze.
  3. Painted.
- E. Special Coatings:
1. Wax.
  2. Lead.
  3. Corrosion-resistant paint.
- 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: Plastic, white finish, one piece, flat.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 18**

2. Sidewall Mounting: Plastic, white finish, one piece, flat.

G. 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.
  - b. Tyco Fire & Building Products LP.
  - c. Victaulic Company.
  - d. Viking Corporation.
2. Standard: UL 199.
3. 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-Motor-Operated Alarm:

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. Globe Fire Sprinkler Corporation.
  - b. Tyco Fire & Building Products LP.
  - c. Victaulic Company.
  - d. Viking Corporation.
2. Standard: UL 753.
3. Type: Mechanically operated, with Pelton wheel.
4. Alarm Gong: Cast aluminum with red-enamel factory finish.
5. Size: 10-inch (250-mm) diameter.
6. Components: Shaft length, bearings, and sleeve to suit wall construction.
7. Inlet: NPS 3/4 (DN 20).
8. Outlet: NPS 1 (DN 25) drain connection.
- 9.

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. AFAC Inc.
  - b. Barksdale, Inc.
  - c. Detroit Switch, Inc.
  - d. Potter Electric Signal Company.
  - e. System Sensor; a Honeywell company.
  - f. Tyco Fire & Building Products LP.
  - g. United Electric Controls Co.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 19**

- h. Viking Corporation.
  - 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; a Honeywell company.
    - b. Kennedy Valve; a division of McWane, Inc.
    - c. Potter Electric Signal Company.
    - d. System Sensor; a Honeywell company.
  - 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.
- E. Indicator-Post 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. Potter Electric Signal Company.
    - b. System Sensor; a Honeywell company.
  - 2. Standard: UL 346.
  - 3. Type: Electrically supervised.
  - 4. Components: Single-pole, double-throw switch with normally closed contacts.
  - 5. Design: Signals that controlled indicator-post valve is in other than fully open position.

**2.11 MANUAL CONTROL STATIONS**

- A. Description: UL listed or FM Global approved, hydraulic operation, with union, NPS 1/2 (DN 15) pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

**2.12 CONTROL PANELS**

- A. Description: Single-area, two-area, or single-area cross-zoned type control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves. Panels contain power supply; battery charger; standby batteries; field-wiring terminal strip; electrically supervised solenoid valves and

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 20**

polarized fire-alarm bell; lamp test facility; single-pole, double-throw auxiliary alarm contacts; and rectifier.

1. Panels: UL listed and FM Global approved when used with thermal detectors and Class A detector circuit wiring. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
2. Manual Control Stations: Electric operation, metal enclosure, labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.
3. Manual Control Stations: Hydraulic operation, with union, NPS 1/2 (DN 15) pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

**2.13 PRESSURE GAGES**

- 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. AMETEK, Inc.; U.S. Gauge Division.
  2. Ashcroft, Inc.
  3. Brecco Corporation.
  4. WIKA Instrument Corporation.
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.
- D. Pressure Gage Range: 0 to 250 psig (0 to 1725 kPa) minimum.
- E. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
- F. Air System Piping Gage: Include retard feature and "AIR" or "AIR/WATER" label on dial face.

**PART 3 - EXECUTION**

**3.01 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.

**3.02 SERVICE-ENTRANCE PIPING**

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements in Division 21 Section "Facility Fire-Suppression Water-Service Piping" for exterior piping.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 21**

- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping. Comply with requirements in Division 21 Section "Facility Fire-Suppression Water-Service Piping" for backflow preventers.
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

**3.03 WATER-SUPPLY CONNECTIONS**

- A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements in Division 22 Section "Domestic Water Piping" for interior piping.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-distribution piping. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for backflow preventers.
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

**3.04 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.
  - 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.
- B. Piping Standard: Comply with requirements in NFPA 13 for installation of sprinkler piping.
- C. Install seismic restraints on piping. Comply with requirements in NFPA 13 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 (DN 50) and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.
- G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- H. Install sprinkler piping with drains for complete system drainage.
- I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- J. Install automatic (ball drip) drain valves to drain piping between fire-department connections and check valves. Drain to floor drain or to outside building.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 22**

- K. Connect compressed-air supply to dry-pipe sprinkler piping.
- L. Connect air compressor to the following piping and wiring:
  - 1. Pressure gages and controls.
  - 2. Electrical power system.
  - 3. Fire-alarm devices, including low-pressure alarm.
- M. Install alarm devices in piping systems.
- N. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements in NFPA 13 for hanger materials.
- O. 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 (DN 8) 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.
- P. Drain dry-pipe sprinkler piping.
- Q. Pressurize and check dry-pipe sprinkler system piping and air-pressure maintenance devices.
- R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 21 Section "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 21 Section "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 21 Section "Escutcheons for Fire-Suppression Piping."

**3.05 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 (DN 50) and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) 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.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 23**

- 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. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
- 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. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Braze Joints" Chapter.
- K. Copper-Tubing Grooved Joints: Roll rounded-edge groove in end of tube according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- L. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and copper pressure-seal fittings with tools recommended by fitting manufacturer.
- M. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.
- N. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

**3.06 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.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 24**

2. Dry-Pipe and Deluge Valves: Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
  - a. Install air compressor and compressed-air supply piping.
  - b. Air-Pressure Maintenance Device: Install shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with 14- to 60-psig (95- to 410-kPa) adjustable range; and 175-psig (1200-kPa) maximum inlet pressure.
  - c. Install compressed-air supply piping from building's compressed-air piping system.

**3.07 SPRINKLER INSTALLATION**

- 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.

**3.08 FIRE-DEPARTMENT CONNECTION INSTALLATION**

- A. Install wall-type, fire-department connections.
- B. Install yard-type, fire-department connections in concrete slab support. Comply with requirements for concrete in Division 03 Section "Cast-in-Place Concrete".
  1. Install two protective pipe bollards around each fire-department connection. Comply with requirements for bollards in Division 05 Section "Metal Fabrications".
- C. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

**3.09 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 Division 26 Section "Identification for Electrical Systems."

**3.10 FIELD QUALITY CONTROL**

- A. Perform tests and inspections.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 25**

- 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. Start and run air compressors.
  - 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.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

**3.11 CLEANING**

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.

**3.12 DEMONSTRATION**

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

**3.13 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 joints.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Copper-tube, extruded-tee connections may be used for tee branches in copper tubing instead of specified copper fittings. Branch-connection joints must be brazed.
- D. Standard-pressure, dry-pipe sprinkler system, NPS 2 (DN 50) and smaller, shall be one of the following:
  - 1. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
  - 2. Standard-weight, galvanized-steel pipe with plain ends; plain-end-pipe fittings; and twist-locked joints.
  - 3. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

**21 1316 WET AND DRY-PIPE SPRINKLER SYSTEMS**  
**PAGE 26**

- E. Standard-pressure, dry-pipe sprinkler system, NPS 2-1/2 to NPS 4 (DN 65 to DN 100), shall be one of the following:
  - 1. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
  - 2. Standard-weight, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
  
- F. Standard-pressure, dry-pipe sprinkler system, NPS 5 and NPS 6 (DN 125 and DN 150), shall be one of the following:
  - 1. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
  - 2. Standard-weight, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

**3.14 SPRINKLER SCHEDULE**

- A. Use sprinkler types in subparagraphs below for the following applications:
  - 1. Rooms without Ceilings: Upright sprinklers.
  - 2. Rooms with Suspended Ceilings: Dry pendent, recessed, flush, and concealed sprinklers as indicated.
  - 3. Wall Mounting: Dry sidewall sprinklers.
  - 4. Spaces Subject to Freezing: Upright sprinklers; and dry sidewall sprinklers as required.
  - 5. Special Applications: Extended-coverage and quick-response sprinklers where required
  
- 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. 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\*\***