

## SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

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

- B. Related Sections:

1. Division 21 Section "Fire-Suppression Standpipes" for standpipe piping.
2. Division 21 Section "Electric-Drive, Centrifugal Fire Pumps" for fire pumps, pressure-maintenance pumps, and fire-pump controllers.

#### 1.3 DEFINITIONS

Some fire-protection products for high-pressure sprinkler piping are only rated for 250 psig (1725 kPa). If 300-psig (2070-kPa) piping is required, verify product pressure ratings.

- A. High-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure higher than standard 175 psig (1200 kPa), but not higher than 250 psig (1725 kPa).
- B. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig (1200 kPa) maximum.

#### 1.4 SYSTEM DESCRIPTIONS

Retain one or more of paragraphs in this article. Combined sprinkler / standpipe system is commonly used. Consult MSU PDC and Fire Marshall.

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.
- B. Deluge Sprinkler System: Open sprinklers are attached to piping connected to water supply through deluge valve. Fire-detection system, in same area as sprinklers, opens valve. Water flows into piping system and discharges from attached sprinklers when valve opens.
- C. Combined Sprinkler / Standpipe System: A standpipe system having piping that supplies both hose connections and automatic sprinklers.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 175-psig (1200-kPa) minimum working pressure.
- B. High-Pressure Piping System Component: Listed for 250-psig (1725-kPa) minimum working pressure.

Retain first paragraph below if Contractor is required to assume responsibility for design.

- C. Delegated Design: Design sprinkler system(s) per NFPA 13-2013, FM Global and additional design criteria on documents where indicated.
- D. Sprinkler system design shall be approved by authorities having jurisdiction.
- E. Sprinkler system shall be hydraulically designed and have a density of at least that required by the hazard rating of the area protected.

#### 1.6 SUBMITTALS

- A. Review Procedure for Projects involving with classrooms:
  - 1. Contractor shall submit the shop drawings, working plans including product data and hydraulic calculations where applicable, to the Factory Mutual (FM) Global and Architect/Engineer (A/E) for their review, and to MSU Fire Marshall and IPF Planning, Design and Construction (PDC) for their record. Review shall be based on applicable NFPA Standards, current version or as specified in the construction document.
  - 2. FM Global shall provide review comments back to the A/E, MSU Fire Marshall and PDC.
  - 3. A/E shall consult with MSU PDC prior to applying comments from the FM Global, and return the shop drawings with review comments back to the Contractor. Repeat the process until the A/E approves the submittals.
  - 4. Contractor shall submit the A/E approved shop drawings to the State of Michigan Office of Fire Safety for final approval prior to installation.

Retain either paragraph above or below.

- B. Review Procedure for Projects not involving with classrooms:
1. Contractor shall submit the shop drawings, working plans including product data and hydraulic calculations where applicable, to the Factory Mutual Global (FMG) and Architect/Engineer (A/E) for their review, and to MSU Fire Marshall and IPF Planning, Design and Construction (PDC) for their record. Review shall be based on applicable NFPA Standards, current version or as specified in the construction document.
  2. FM Global shall provide review comments back to the A/E, MSU Fire Marshall and PDC.
  3. A/E shall consult with MSU PDC prior to applying comments from the FM Global, and return the shop drawings with review comments back to the Contractor. Repeat the process until the A/E approves the submittals.
  4. Contractor shall submit the A/E approved shop drawings to MSU Fire Marshal thru Project Representative for final approval prior to installation.
- C. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- D. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.

Retain subparagraph below if equipment includes wiring.

1. Wiring Diagrams: For power, signal, and control wiring.
- E. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13 and FM Global that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

Retain first paragraph below if retaining procedures for welder certification in "Quality Assurance" Article.

- F. Welding certificates.

Retain first paragraph below if report is specified in "Preparation" Article.

- 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.

## 1.7 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.
- 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."

## 1.8 PROJECT CONDITIONS

Retain this article if interruption of existing sprinkler service is required.

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

## 1.9 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

### 2.1 PIPING MATERIALS

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

## 2.2 STEEL PIPE AND FITTINGS

All steel piping in this article is suitable for 175-psig (1200-kPa) minimum working pressure. Pipe in first paragraph below is intended for use with flanged, cut- or roll-grooved, plain-end-pipe, threaded, and welded joints. Pipe is available in NPS 1/8 to NPS 26 (DN 6 to DN 650). Use only black-steel pipe for roll-grooved and welded joints. Match options for fitting and pipe finish.

- A. Standard Weight, Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Hot dipped galvanized where indicated. Pipe ends may be factory or field formed to match joining method.

Nipples in first paragraph below are available in NPS 1/8 to NPS 12 (DN 6 to DN 300).

- B. Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends, hot dipped galvanized where indicated.

Couplings in first paragraph below are available in NPS 1/8 to NPS 20 (DN 6 to DN 500).

- C. Steel Couplings: ASTM A 865, threaded, hot dipped galvanized where indicated.

Fittings in first paragraph below are available in NPS 1/4 to NPS 12 (DN 8 to DN 300).

- D. Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern, hot dipped galvanized where indicated.

Unions in first paragraph below are available in NPS 1/4 to NPS 3 (DN 8 to DN 80), but NFPA limits them to NPS 2 (DN 50) and smaller.

- E. Malleable- or Ductile-Iron Unions: UL 860.

Flanges in first paragraph below are available in NPS 1 to NPS 96 (DN 25 to DN 2400).

- F. Cast-Iron Flanges: ASME 16.1, Class 125.

Flanges and fittings in first paragraph below are available in NPS 1/2 to NPS 24 (DN 15 to DN 600).

- G. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

Fittings in first paragraph below are available in NPS 1/2 to NPS 48 (DN 15 to DN 1200).

- H. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.

- I. Grooved-Joint, Steel-Pipe Appurtenances:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Shurjoint Piping Products.
  - b. Tyco Fire & Building Products LP.
  - c. Victaulic Company.
2. Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe, hot dipped galvanized where indicated.

AWWA C606 and UL 213 cover couplings in subparagraph below in NPS 3/4 to at least NPS 12 (DN 20 to at least DN 300).

3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

## 2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free.
  1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
  2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

## 2.4 LISTED FIRE-PROTECTION VALVES

- A. General Requirements:
  1. Valves shall be UL listed or FM approved.
  2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig (1200 kPa).
  3. Minimum Pressure Rating for High-Pressure Piping: 250 psig (1725 kPa).
- B. Ball Valves:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Anvil International, Inc.
    - b. NIBCO.
    - c. Victaulic Company.
  2. Standard: UL 1091 except with ball instead of disc.
  3. Valves NPS 1-1/2 (DN 40) and Smaller: Bronze body with threaded ends.
  4. 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.
  5. Valves NPS 3 (DN 80): Ductile-iron body with grooved ends.
- C. Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Anvil International, Inc.
  - b. Kennedy Valve; a division of McWane, Inc.
  - c. Milwaukee Valve Company.
  - d. NIBCO INC.
  - e. Shurjoint Piping Products.
  - f. Tyco Fire & Building Products LP.
  - g. Victaulic Company.
2. Standard: UL 1091.
3. Valves NPS 2 (DN 50) and Smaller: Bronze body with threaded ends.
4. Valves NPS 2-1/2 (DN 65) and Larger: Cast or ductile iron body with flanged or grooved ends.

D. Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Anvil International, Inc.
  - b. Clow Valve Company; a division of McWane, Inc.
  - c. Crane Co.; Crane Valve Group; Crane Valves.
  - d. Crane Co.; Crane Valve Group; Jenkins Valves.
  - e. Crane Co.; Crane Valve Group; Stockham Division.
  - f. Fire-End & Croker Corporation.
  - g. Kennedy Valve; a division of McWane, Inc.
  - h. Milwaukee Valve Company.
  - i. Mueller Co.; Water Products Division.
  - j. NIBCO INC.
  - k. Potter Roemer.
  - l. Reliable Automatic Sprinkler Co., Inc.
  - m. Shurjoint Piping Products.
  - n. Tyco Fire & Building Products LP.
  - o. Victaulic Company.
  - p. Viking Corporation.
2. Standard: UL 312.
3. Type: Swing check.
4. Body Material: Cast iron.
5. End Connections: Flanged or grooved.

E. OS&Y Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Clow Valve Company; a division of McWane, Inc.

- b. Crane Co.; Crane Valve Group; Crane Valves.
  - c. Crane Co.; Crane Valve Group; Jenkins Valves.
  - d. Crane Co.; Crane Valve Group; Stockham Division.
  - e. Hammond Valve.
  - f. Milwaukee Valve Company.
  - g. Mueller Co.; Water Products Division.
  - h. NIBCO INC.
  - i. Shurjoint Piping Products.
  - j. Tyco Fire & Building Products LP.
2. Standard: UL 262.
  3. Valves NPS 2 (DN 50) and Smaller: Bronze body with threaded ends.
  4. Valves NPS 2-1/2 (DN 65) and Larger: Cast or ductile iron body with flanged or grooved ends.

F. Indicating-Type Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Anvil International, Inc.
  - b. Kennedy Valve; a division of McWane, Inc.
  - c. Milwaukee Valve Company.
  - d. NIBCO INC.
  - e. Shurjoint Piping Products.
  - f. Tyco Fire & Building Products LP.
  - g. Victaulic Company.
2. Standard: UL 1091.
3. Pressure Rating: 175 psig (1200 kPa) minimum.
4. Valves NPS 2 (DN 50) and Smaller:
  - a. Valve Type: Ball or butterfly.
  - b. Body Material: Bronze.
  - c. End Connections: Threaded.
5. 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.
6. Valve Operation: Integral electrical, 115-V ac, prewired, two-circuit, supervisory switch visual indicating device.



## 2.5 TRIM AND DRAIN VALVES

Trim and drain valves are UL listed, are typically used as part of specialty control valve trim and drain piping, and are NPS 2 (DN 50) and smaller. Most of these valves are ball type, but there are also a few angle, butterfly, gate, and globe types listed. No UL standard exists for these valves.

### A. General Requirements:

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.

## 2.6 SPECIALTY VALVES

### A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. 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. Alarm Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Reliable Automatic Sprinkler Co., Inc.
  - b. Tyco Fire & Building Products LP.
  - c. Victaulic Company.
  - d. Viking Corporation.
2. Standard: UL 193.
3. Design: For horizontal or vertical installation.
4. Drip Cup Assembly: Pipe drain with check valve to main drain piping.

### C. Automatic (Ball Drip) Drain Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Reliable Automatic Sprinkler Co., Inc.
  - b. Tyco Fire & Building Products LP.

2. Standard: UL 1726.
3. Pressure Rating: 175 psig (1200 kPa) minimum.
4. Type: Automatic draining, ball check.
5. Size: NPS 3/4 (DN 20).
6. End Connections: Threaded.

## 2.7 FIRE-DEPARTMENT CONNECTIONS

Coordinate fire-department connections with Division 21 Sections "Fire-Suppression Standpipes" and "Dry-Pipe Sprinkler Systems." Confirm with ELFD.

### A. Wall Mounted Storz Type, Fire-Department Connection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Elkhart Brass Mfg. Company, Inc.
  - b. Guardian Fire Equipment, Inc.
  - c. Potter Roemer.
2. Standard: UL 405.
3. Type: Wall mounted.
4. Pressure Rating: 175 psig (1200 kPa) minimum.
5. Body Material: Corrosion-resistant metal.
6. Inlets: Straight pattern Storz adapter, forged aluminum with powder coat finish matching local fire department sizes.
7. Caps: Forged aluminum with powder coat finish Storz cap with cable connector.
8. Identification Plate: Round, brass, wall type.
9. Outlet: 5" with pipe threads.
10. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" or "AUTO SPKR."
11. Finish: Forged aluminum with powder coat and galvanized steel elbow.

## 2.8 SPRINKLER SPECIALTY PIPE FITTINGS

### A. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Shurjoint Piping Products.
  - b. Tyco Fire & Building Products LP.
  - c. Victaulic Company.
2. Standard: UL 213.
3. Pressure Rating: 175 psig (1200 kPa) minimum.
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.

B. Flow Detection and Test Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AGF Manufacturing Inc.
  - b. Reliable Automatic Sprinkler Co., Inc.
  - c. Tyco Fire & Building Products LP.
  - d. Victaulic Company.
2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig (1200 kPa) 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.

C. Branch Line Testers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Elkhart Brass Mfg. Company, Inc.
  - b. Fire-End & Croker Corporation.
  - c. Potter Roemer.
2. Standard: UL 199.
3. Pressure Rating: 175 psig (1200 kPa).
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, provide products by one of the following:
  - a. AGF Manufacturing Inc.
  - b. Tyco Fire & Building Products LP.
  - c. Victaulic Company.
  - d. Viking Corporation.

2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig (1200 kPa) minimum.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

## 2.9 SPRINKLERS

Coordinate this article with "Sprinkler Schedule" Article.

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Reliable Automatic Sprinkler Co., Inc.
  2. Tyco Fire & Building Products LP.
  3. Victaulic Company.
  4. 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 Automatic Sprinklers: 175 psig (1200 kPa) minimum.
  3. Pressure Rating for High-Pressure Automatic Sprinklers: 250 psig (1725 kPa) minimum.
  4. Temperature Rating: 165 deg. F unless otherwise indicated.
- C. Automatic Sprinklers with Heat-Responsive Element:
1. Early-Suppression, Fast-Response Applications: UL 1767.
  2. Nonresidential Applications: UL 199.
  3. Characteristics: Nominal 1/2-inch (12.7-mm) orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
  4. Element Type: Glass bulb.

Retain first paragraph below for deluge-sprinkler piping system.

- D. Open Sprinklers with Heat-Responsive Element Removed: UL 199.

1. Characteristics:

Revise two subparagraphs below to suit Project.

- a. Nominal 1/2-inch (12.7-mm) Orifice: With Discharge Coefficient K between 5.3 and 5.8.
- b. Nominal 17/32-inch (13.5-mm) Orifice: With Discharge Coefficient K between 7.4 and 8.2.

Retain sprinkler finishes in first paragraph below that are indicated in "Sprinkler Schedule" Article.

- E. Sprinkler Finishes:
  - 1. Chrome plated.
  - 2. Bronze.
  - 3. Painted.
- 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.
- G. Sprinkler Guards:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of 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, provide products by one of the following:
    - a. Tyco Fire & Building Products LP.
    - b. Victaulic Company.
    - c. 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.
- C. Electrically Operated Alarm Bell:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Notifier; a Honeywell company.
  - b. Potter Electric Signal Company.
2. Standard: UL 464.
  3. Type: Vibrating, metal alarm bell.
  4. Size: 10-inch (250-mm) diameter.
  5. Finish: Red-enamel factory finish, suitable for outdoor use.
- D. Water-Flow Indicators:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. McDonnell & Miller; ITT Industries.
    - b. Potter Electric Signal Company.
    - c. System Sensor; a Honeywell company.
    - d. Viking Corporation.
  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 (1725 kPa).
  7. Design Installation: Horizontal or vertical.
- E. Pressure Switches:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Potter Electric Signal Company.
    - b. System Sensor; a Honeywell company.
    - c. Tyco Fire & Building Products LP.
    - d. 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.
- F. Valve Supervisory Switches:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Kennedy Valve; a division of McWane, Inc.
  - b. Potter Electric Signal Company.
  - c. 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.
- G. Indicator-Post Supervisory Switches:
1. Manufacturers: Subject to compliance with requirements, provide products by one of 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 PRESSURE GAGES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AMETEK; U.S. Gauge Division.
  2. Ashcroft, Inc.
- 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 "AIR" or "AIR/WATER" label on dial face.

## PART 3 - EXECUTION

### 3.1 PREPARATION

Retain this article if fire-hydrant flow test is required or if Owner has not provided flow information.  
Consult PDC.

- 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

Retain this article and delete "Water-Supply Connections" Article if connection to building's water-service piping is required.

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Division 21 Section "Facility Fire-Suppression Water-Service Piping."
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping. Comply with requirements for backflow preventers in Division 22 Section "Domestic Water Piping Specialties."

### 3.3 WATER-SUPPLY CONNECTIONS

Retain this article and delete "Service-Entrance Piping" Article if connection to building's water-distribution piping is required.

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

### 3.4 PIPING INSTALLATION

- A. Refer to Division 21 Section "Common Work Result for Fire Suppression" for basic installation requirements.
- B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
  - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- C. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
- 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. Unless indicated otherwise, inspector's test connections shall be located at the end of the most remote branch line in the upper story. Test valve shall be located not over 7' above the floor and in lockable rooms. Discharge shall be to floor drain equipped with a funnel.
- H. Install sprinkler piping with drains for complete system drainage. Terminate drain lines to the nearest floor drain with funnel or to a service sink.
- I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- J. For combined sprinkler / standpipe systems, install 2-1/2" hose valve and sprinkler control assembly including OS&Y valves with tamper, flow switch, and inspector's test and drain valves in each floor. Connect drain lines to drain risers.
- K. 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.
- L. Install alarm devices in piping systems. A flow alarm switch shall be provided in the sprinkler riser and shall be wired into the fire alarm system. Where a main line branches out, a separate alarm shall be installed on each branch to a different building or section of building. A separate flow alarm switch for the standpipe risers is not required for the combined system.
- M. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- N. 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.
- O. Fill sprinkler system piping with water.
- P. Install electric heating cables and pipe insulation on sprinkler piping in areas subject to freezing. Comply with requirements for heating cables in Division 21 "Heat Tracing for Fire-Suppression Piping" and for piping insulation in Division 21 Section "Fire-Suppression Systems Insulation."
- Q. Underground pipe and fittings for fire protection shall be installed in accordance with AWWA specification. Refer to Water Distribution Section in Division 2 for details.

### 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 (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.
- 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.

### 3.6 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. System water supply valves, isolation control valves, and other valves in feed mains shall be supervised by locking valves open. Padlocks with Best cylinders will be provided by MSU, and installed by the Contractors.
- D. Install backflow preventers in potable-water-supply sources.
- E. Specialty Valves:
  - 1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
  - 2. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.

### 3.7 SPRINKLER INSTALLATION

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

Caution: Dry-type sprinklers in first paragraph below can be used with wet-pipe sprinkler systems. Typical applications would be in freezer boxes and at loading docks where dry-type sprinkler supply pipe extends into a heated place and connects to wet-pipe system.

- 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. Provide automatic sprinklers of ordinary or intermediate temperature rating in the elevator machine room. Each system shall have a readily accessible shut-off valve, that is electronically supervised, located outside the protected area, per agreement signed by the Bureau of Fire Services, Plan Review Division and the Bureau of Construction Codes, Elevator Safety Division.

### 3.8 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."
- C. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

### 3.9 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."
- C. All exposed sprinkler piping in unfinished areas shall be painted red. All exposed piping in finished areas shall be painted to match the adjoining walls and ceilings. At intervals not to exceed 50 feet, provide printed identification and flow direction labels entitled "SPRINKLER-FIRE." Color shall be white letters on red background. Labels shall be snap on style equal to Seton "Setmark."

### 3.10 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
  - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
  - 4. Energize circuits to electrical equipment and devices.
  - 5. Start and run excess-pressure pumps.
  - 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 and pressure-maintenance pumps.

### 3.13 PIPING SCHEDULE

- A. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.
- B. Piping between Domestic Water Supply Connection and Backflow Preventers: Galvanized, standard-weight steel pipe with grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.
- C. Standard-pressure, wet-pipe sprinkler system, NPS 2 (DN 50) and smaller, shall be one the following:
  - 1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
- D. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 (DN 65) and larger, shall be the following:
  - 1. Standard-weight, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
  - 2. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.
- E. High-pressure, wet-pipe sprinkler system, NPS 4 (DN 100) and smaller, shall be the following:
  - 1. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.
- F. High-pressure, wet-pipe sprinkler system, NPS 5 (DN 125) and larger, shall be the following:
  - 1. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.

### 3.14 SPRINKLER SCHEDULE

Retain this article to require selected products to be used in indicated applications; delete to allow Contractor to choose among various products acceptable to authorities having jurisdiction, or if delegating sprinkler system design to Contractor. According to NFPA 13, Drawings shall indicate sprinkler make, type, model, and nominal k-factor including sprinkler identification number.

- A. Use sprinkler types in subparagraphs below for the following applications:
  - 1. Rooms without Ceilings: Upright sprinklers.
  - 2. Rooms with Suspended Ceilings: 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.
- 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; with listed guard in exposed areas.

END OF SECTION 211313