SECTION 211316 - DRY-PIPE SPRINKLER SYSTEMS

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on Masterworks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on Masterworks/Supporting Information.

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. Specialty valves.
3. Sprinkler specialty pipe fittings.
4. Sprinklers.
5. Alarm devices.
6. Manual control stations.
7. Control panels.
8. Pressure gages.

B. Related Requirements:

1. Section 211119 "Fire Department Connections" for exposed-, flush-, and yard-type fire department connections.
2. Section 230523 "General-Duty Valves for Water-Based Fire-Suppression Piping" for ball, butterfly, check, gate, post-indicator, and trim and drain valves.

1.3 DEFINITIONS

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

B. EPDM- Ethylene propylene diene monomer.

C. FKM: Fluoroelastomer flat black in color.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, technical data sheets, product instructions, and furnished specialties and accessories.

B. Shop Drawings: For dry-pipe sprinkler systems.

1. Include plans, elevations, sections, and attachment details.
2. Include diagrams for power, signal, and control wiring.

C. Delegated-Design Submittal: For dry-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including calculations and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Domestic water piping.
2. Compressed air piping.
3. HVAC hydronic piping.
4. Items penetrating finished ceiling including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. <**Insert item**>.

5. <**Insert item**>.

B. Qualification Data: For qualified Installer[**and professional engineer**].

C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

D. Fire-hydrant flow test report.

E. 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."

F. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For dry-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals. Include technical data sheets, product instructions, and design calculation reports.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.

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

2. Press-Connect Joining Procedure for Copper and Stainless Steel Tubing: Qualify operators according to training provided by Viega; Plumbing and Heating Systems.
3. Press-Connect Joining Procedure for Steel Piping. Qualify operators according to training provided by Viega; Plumbing and Heating Systems.

1.9 FIELD CONDITIONS

A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:

1. Notify [**Architect**] [**Construction Manager**] [**Owner**] no fewer than [**two**] <**Insert number**> days in advance of proposed interruption of sprinkler service.
2. Do not proceed with interruption of sprinkler service without [**Architect's**] [**Construction Manager's**] [**Owner's**] written permission.

1.10 WARRANTY

A. Special Limited Warranty: Viega LLC warrants to wholesalers, and licensed plumbing and mechanical contractors in the United States and Canada, that its fittings, when properly installed in nonindustrial and non-marine applications and under normal conditions of use, will be free of failure from manufacturing defect for the following component warranty periods:

1. Warranty Period for ProPress Fittings: 50 years from date of Substantial Completion.
2. Warranty Period for ProPress Valves: Two years from date of Substantial Completion.
3. Warranty Period for MegaPress Fittings: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 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 opened sprinklers.

B. Combined Dry-Pipe and Preaction Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Fire-detection system, located in same area as sprinklers, actuates tripping devices that open dry-pipe valve without loss of air pressure and actuates fire alarm. Water discharges from opened sprinklers.

C. Single-Interlock Preaction Sprinkler System: Automatic sprinklers are attached to piping containing low-pressure air. Actuation of fire-detection system, located in same area as sprinklers, opens deluge valve, permitting water to flow into sprinkler piping and to discharge from opened sprinklers.

D. Double-Interlock Preaction Sprinkler System: Automatic sprinklers are attached to piping containing low-pressure air. Actuation of a fire-detection system, located in same area as sprinklers, opens deluge valve, permitting water to flow into sprinkler piping. A closed solenoid valve in the sprinkler piping is opened by another fire-detection device; water will then discharge from opened sprinklers.

2.2 PERFORMANCE REQUIREMENTS

A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13.
2. NFPA 13R.

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

C. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design wet-pipe sprinkler systems.

1. Available fire-hydrant flow test records indicate the following conditions:

a. Date: <**Insert test date**>.
b. Time: <**Insert time**> [**a.m.**] [**p.m.**]
c. Performed by: <**Insert operator's name**> of <**Insert firm**>.
d. Location of Residual Fire Hydrant R: <**Insert location**>.
e. Location of Flow Fire Hydrant F: <**Insert location**>.
f. Static Pressure at Residual Fire Hydrant R: <**Insert psig (kPa)**>.
g. Measured Flow at Flow Fire Hydrant F: <**Insert gpm (L/s)**>.
h. Residual Pressure at Residual Fire Hydrant R: <**Insert psig (kPa)**>.

D. Sprinkler system design shall be approved by authorities having jurisdiction.

1. Margin of Safety for Available Water Flow and Pressure: [**10**] [**20**] <**Insert number**> percent, including losses through water-service piping, valves, and backflow preventers.
2. Sprinkler Occupancy Hazard Classifications:

a. Automobile Parking Areas: [**Ordinary Hazard, Group 1**] <**Insert classification**>.
b. Building Service Areas: [**Ordinary Hazard, Group 1**] <**Insert classification**>.
c. Churches: [**Light Hazard**] <**Insert classification**>.
d. Electrical Equipment Rooms: [**Ordinary Hazard, Group 1**] <**Insert classification**>.
e. Dry Cleaners: [**Ordinary Hazard, Group 2**] <**Insert classification**>.
f. General Storage Areas: [**Ordinary Hazard, Group 1**] <**Insert classification**>.
g. Laundries: [**Ordinary Hazard, Group 1**] <**Insert classification**>.
h. Libraries except Stack Areas: [**Light Hazard**] <**Insert classification**>.
i. Library Stack Areas: [**Ordinary Hazard, Group 2**] <**Insert classification**>.
j. Machine Shops: [**Ordinary Hazard, Group 2**] <**Insert classification**>.
k. Mechanical Equipment Rooms: [**Ordinary Hazard, Group 1**] <**Insert classification**>.
l. Office and Public Areas: [**Light Hazard**] <**Insert classification**>.
m. Plastics Processing Areas: [**Extra Hazard, Group 2**] <**Insert classification**>.
n. Printing Plants: [**Extra Hazard, Group 1**] <**Insert classification**>.
o. Repair Garages: [**Ordinary Hazard, Group 2**] <**Insert classification**>.
p. Restaurant Service Areas: [**Ordinary Hazard, Group 1**] <**Insert classification**>.
q. Solvent Cleaning Areas: [**Extra Hazard, Group 2**] <**Insert classification**>.

r. Upholstering Plants: [**Extra Hazard, Group 1**] <**Insert classification**>.
s. <**Insert classification**>.

3. Minimum Density for Automatic-Sprinkler Piping Design:

a. Light-Hazard Occupancy: [**0.10 gpm over 1500-sq. ft. (4.1 mm/min. over 139-sq. m)**] <**Insert value**> area.
b. Ordinary-Hazard, Group 1 Occupancy: [**0.15 gpm over 1500-sq. ft. (6.1 mm/min. over 139-sq. m)**] <**Insert value**> area.
c. Ordinary-Hazard, Group 2 Occupancy: [**0.20 gpm over 1500-sq. ft. (8.1 mm/min. over 139-sq. m)**] <**Insert value**> area.
d. Extra-Hazard, Group 1 Occupancy: [**0.30 gpm over 2500-sq. ft. (12.2 mm/min. over 232-sq. m)**] <**Insert value**> area.
e. Extra-Hazard, Group 2 Occupancy: [**0.40 gpm over 2500-sq. ft. (16.3 mm/min. over 232-sq. m)**] <**Insert value**> area.
f. Special Occupancy Hazard: As determined by authorities having jurisdiction.

4. Maximum Protection Area per Sprinkler: According to UL listing.
5. Maximum Protection Area per Sprinkler:

a. Office Spaces: [**120 sq. ft. (11.1 sq. m)**] [**225 sq. ft. (20.9 sq. m)**] <**Insert dimension**>.
b. Storage Areas: [**130 sq. ft. (12.1 sq. m)**] <**Insert dimension**>.
c. Mechanical Equipment Rooms: [**130 sq. ft. (12.1 sq. m)**] <**Insert dimension**>.
d. Electrical Equipment Rooms: [**130 sq. ft. (12.1 sq. m)**] <**Insert dimension**>.
e. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.

6. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:

a. Light-Hazard Occupancies: [**100 gpm (6.3 L/s) for 30 minutes**] <**Insert requirement**>.
b. Ordinary-Hazard Occupancies: [**250 gpm (15.75 L/s) for 60 to 90 minutes**] <**Insert requirement**>.
c. Extra-Hazard Occupancies: [**500 gpm (31.5 L/s) for 90 to 120 minutes**] <**Insert requirement**>.
d. <**Insert requirement**>.

E. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and [**ASCE/SEI 7**] <**Insert requirement**>.

2.3 STEEL PIPE AND FITTINGS

A. Standard-Weight, Galvanized-Steel Pipe: ASTM A 53/A 53M, [**Type E**] <**Insert type**>, [**Grade B**] <**Insert grade**>. Pipe ends may be factory or field formed to match joining method.

B. Schedule 30, Galvanized-Steel Pipe: ASTM A 135/A 135M; ASTM A 795/A 795M, [**Type E**] <**Insert type**>; 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/A 135M 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/A 865M, threaded.

F. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

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, provide products by one of the following:

a. Anvil International.
b. Shurjoint Piping Products.
c. <**Insert manufacturer's name**>.

J. Grooved-Joint, Steel-Pipe Appurtenances:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anvil International.
b. Corcoran Piping System Co.
c. National Fittings, Inc.
d. Shurjoint Piping Products.
e. Smith-Cooper International.
f. Tyco Fire & Building Products LP.
g. Victaulic Company.
h. <**Insert manufacturer's name**>.

2. Pressure Rating: [**175-psig (1200-kPa)**] [**250-psig (1725-kPa)**] [**300-psig (2070-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.

K. Steel Press-Connect Flanges:

1. Design: UL 213, FM Global-approved, 175 psig (1200 kPa) pressure rating with steel housing, rubber EPDM O-rings, and pipe stop; for use with fitting manufacturer's electro-hydraulic press-connect tools.
2. Class 150, Carbon steel, Raised-Face Flanges: Full-face gaskets.
3. For use with ASTM A53, A106, A135 and A795, Schedule 5 to Schedule 40 black iron pipe.

L. Stainless Steel Press-Connect Flanges:

1. Design: UL 213-approved, 175 psig (1200 kPa) pressure rating with stainless steel housing, rubber FKM O-rings, and pipe stop; for use with fitting manufacturer's electro-hydraulic press-connect tools.
2. Class 150, 304 Stainless Steel, Raised-Face Flanges: Full-face gaskets.
3. Stainless steel tube and fittings shall be provided by the same manufacturer.
4. Pipe Standard: Stainless steel pipe shall conform to the material requirements of ASTM A 312 or ASTM A 554.

M. Stainless Steel Press-Connect Fittings:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Viega LLC; ProPress Stainless Steel or comparable product by one of the following

   a. <**Insert manufacturer's name**>.

2. Pressure Rating: UL 213-approved, 175-psig (1200-kPa).
3. Design: For NPS 1/2 to NPS 4 (DN 15 to DN 100) type 304 stainless steel NTS/CTS. Stainless steel tube and fittings provided by the same manufacturer.
4. Pipe Standard: ASTM A 312 or ASTM A 554.
5. Press-Connect Fittings: ASTM A 312.
6. Threaded Fittings: Tapered threads conforming to ASTM B 1.20.1.
7. Press Ends: Unpressed fitting identification feature to the fitting wall.
8. Sealing Element and Pipe Stops: FKM.
9. Tools: Manufacturer's electro-hydraulic press-connect tools.

N. Steel Press-Connect Fittings:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Viega LLC; MegaPress Stainless Steel or comparable product by one of the following

   a. <**Insert manufacturer's name**>.

2. Pressure Rating: UL 213, FM Global-approved, 175 psig (1200 kPa).
3. Pipe Standard: [**ASTM A53**] [**ASTM A135**] [**ASTM A 795**] [**ASTM A 106**], black steel pipe.
4. Press-connect Mechanical Joint Fitting: ASTM A 420 or ASME B 16.3 and performance criteria of IAPMO PS117 or ICC LC 1002.
5. Sealing Element: EPDM.
6. Sealing Elements: Factory installed or an alternative supplied by fitting manufacturer.
7. Press Ends: Unpressed fitting identification feature to the fitting wall.
8. Pipe Threads: ASTM B 16.3.
9. Hangers and Supports: MSS SP 58 and MSS SP 69.

10. Sealing Elements and Pipe Stops: EPDM.
11. Tools: Manufacturer's special tool.

2.4 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: [**ASTM B 88, Type L (ASTM B 88M, Type B)**] [**and**] [**ASTM B 88, Type M (ASTM B 88M, Type C)**] water tube, drawn temper.

B. Cast-Copper, Solder-Joint Fittings: ASME B16.18 pressure fittings.

C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22 pressure fittings.

D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

1. Pipe-Flange Gasket Materials: [**AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick**] [**or**] [**ASME B16.21, nonmetallic and asbestos free**].

F. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

G. Copper or Bronze Press-Connect Fittings:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Viega LLC ProPress Fittings or comparable product by one of the following:

a. <**Insert manufacturer's name**>.

2. Standard: UL 213, FM 1920.
3. NPS 2-1/2 thru NPS 4 (DN 65 thru DN 100) Fittings: Stainless steel grip ring and separator ring.
4. Press Ends: Unpressed fitting identification feature to the fitting wall.
5. Sealing Element: EPDM.

H. Cast Copper Alloy Pipe Flanges with Press-Connect Fittings.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Viega LLC; ProPress Copper or comparable product by one of the following:

a. NIBCO, INC.
b. <**Insert manufacturer's name**>.

2. Standard: UL 213, FM 1920.
3. Flanges: ASME B 16.24, Class 150, powder coated steel plate; two-piece design.
4. NPS 2-1/2 thru NPS 4 (DN 65 thru DN 100) Fittings: Stainless steel grip ring and separator ring.
5. Housing: Copper or bronze.
6. Press Ends: Unpressed fitting identification feature to the fitting wall.
7. Sealing Element: EPDM.

I. Grooved-Joint, Copper-Tube Appurtenances:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anvil International.
b. Shurjoint Piping Products.
c. Victaulic Company.
d. <**Insert manufacturer's name**>.

2. Grooved-End Copper Fittings: ASTM B 75 (ASTM B 75M), copper tube or ASTM B 584 bronze castings.
3. Grooved-End-Tube Couplings: To fit copper-tube dimensions, with design similar to AWWA C606. Include ferrous housing sections, EPDM-rubber gasket suitable for hot and cold water, and bolts and nuts.

J. Copper-Tube, Extruded-Tee Connections:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. T-DRILL Industries Inc.
b. <**Insert manufacturer's name**>.

2. Description: Tee formed in copper tube according to ASTM F 2014.

2.5 SPECIALTY VALVES

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating:

1. Standard-Pressure Piping Specialty Valves: 175-psig (1200-kPa) minimum.

C. Body Material: Cast or ductile iron.

D. Size: Same as connected piping.

E. End Connections: Flanged or grooved.

F. Dry-Pipe Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Globe Fire Sprinkler Corporation.
b. Reliable Automatic Sprinkler Co., Inc. (The).
c. Tyco Fire & Building Products LP.
d. Venus Fire Protection Ltd.
e. Victaulic Company.
f. Viking Corporation.

g. <**Insert manufacturer's name**>.

2. Standard: UL 260.
3. Design: Differential-pressure type.
4. 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.
5. Air-Pressure Maintenance Device:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Globe Fire Sprinkler Corporation.
      2) Reliable Automatic Sprinkler Co., Inc. (The).
      3) Tyco Fire & Building Products LP.
      4) Venus Fire Protection Ltd.
      5) Victaulic Company.
      6) Viking Corporation.
      7) <**Insert manufacturer's name**>.

6. Standard: UL 260.
7. Type: Automatic device to maintain minimum air pressure in piping.
8. 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 [**175-psig (1200-kPa)**] [**300-psig (2070-kPa)**] outlet pressure.
9. Air Compressor:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Gast Manufacturing Inc.
      2) General Air Products, Inc.
      3) Viking Corporation.
      4) <**Insert manufacturer's name**>.

   b. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
   c. Motor Horsepower: Fractional.
   d. Power: 120-V ac, 60 Hz, single phase.

G. Deluge Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. BERMAD Control Valves.
   b. CLA-VAL Automatic Control Valves.
   c. Globe Fire Sprinkler Corporation.
   d. OCV Control Valves.
   e. Reliable Automatic Sprinkler Co., Inc. (The).

f. Tyco Fire & Building Products LP.
g. Venus Fire Protection Ltd.
h. Victaulic Company.
i. Viking Corporation.
j. <**Insert manufacturer's name**>.

2. Standard: UL 260.
3. Design: Hydraulically operated, differential-pressure type.
4. Include trim sets for alarm-test bypass, drain, electrical water-flow alarm switch, pressure gages, drip cup assembly piped without valves and separate from main drain line, and fill-line attachment with strainer.
5. 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.
6. Air-Pressure Maintenance Device:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Globe Fire Sprinkler Corporation.
2) Reliable Automatic Sprinkler Co., Inc. (The).
3) Tyco Fire & Building Products LP.
4) Venus Fire Protection Ltd.
5) Victaulic Company.
6) Viking Corporation.
7) <**Insert manufacturer's name**>.

b. Standard: UL 260.
c. Type: Automatic device to maintain minimum air pressure in piping.
d. 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 [**175-psig (1200-kPa)**] [**300-psig (2070-kPa)**] outlet pressure.

7. Air Compressor:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Gast Manufacturing Inc.
2) General Air Products, Inc.
3) Viking Corporation.
4) <**Insert manufacturer's name**>.

8. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
9. Motor Horsepower: Fractional.
10. Power: 120-V ac, 60 Hz, single phase.

11. 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

H. 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. (The).
   b. Tyco Fire & Building Products LP.
   c. <**Insert manufacturer's name**>.

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.

2.6 SPRINKLER PIPING SPECIALTIES

A. General Requirements for Dry-Pipe System Fittings: [**UL listed**] <**Insert standard**> for dry-pipe service.

B. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Anvil International.
   b. National Fittings, Inc.
   c. Shurjoint Piping Products.
   d. Tyco Fire & Building Products LP.
   e. Victaulic Company.
   f. <**Insert manufacturer's name**>.

2. Standard: UL 213.
3. Pressure Rating: [**175-psig (1200-kPa) minimum**] [**300 psig (2070 kPa)**].
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-tee and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

C. 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. (The).
c. Tyco Fire & Building Products LP.
d. Victaulic Company.
e. <**Insert manufacturer's name**>.

2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: [**175-psig (1200-kPa) minimum**] [**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, provide products by one of the following:

a. Elkhart Brass Mfg. Co., Inc.
b. Fire-End & Croker Corporation.
c. Potter Roemer LLC.
d. <**Insert manufacturer's name**>.

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, provide products by one of the following:

a. AGF Manufacturing Inc.
b. Triple R Specialty.
c. Tyco Fire & Building Products LP.
d. Victaulic Company.
e. Viking Corporation.
f. <**Insert manufacturer's name**>.

2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: [**175-psig (1200-kPa) minimum**] [**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, provide products by one of the following:

    a. CECA, LLC.
    b. Corcoran Piping System Co.
    c. Merit Manufacturing.
    d. <**Insert manufacturer's name**>.

2. Standard: UL 1474.
3. Pressure Rating: [**250-psig (1725-kPa) minimum**] [**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, provide products by one of the following:

    a. Fivalco Inc.
    b. FlexHead Industries, Inc.
    c. Gateway Tubing, Inc.
    d. Victaulic Company.
    e. <**Insert manufacturer's name**>.

2. Standard: UL 1474.
3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
4. Pressure Rating: [**175-psig (1200-kPa) minimum**] [**300 psig (2070 kPa)**].
5. Size: Same as connected piping, for sprinkler.

2.7 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Globe Fire Sprinkler Corporation.
2. Reliable Automatic Sprinkler Co., Inc. (The).
3. Tyco Fire & Building Products LP.
4. Venus Fire Protection Ltd.
5. Victaulic Company.
6. Viking Corporation.
7. <**Insert manufacturer's name**>.

B. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

C. Pressure Rating for Residential Sprinklers: 175-psig (1200-kPa) maximum.

D. Pressure Rating for Automatic Sprinklers: 175-psig (1200-kPa) minimum.

E. Pressure Rating for High-Pressure Automatic Sprinklers: [**250-psig (1725-kPa) minimum**] [**300 psig (2070 kPa)**].

F. Automatic Sprinklers with Heat-Responsive Element:

1. Nonresidential Applications: [**UL 199**] <**Insert standard**>.
2. Residential Applications: [**UL 1626**] <**Insert standard**>.
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.

G. Sprinkler Finishes: [**Chrome plated**] [**bronze**] [**and**] [**painted**].

H. Special Coatings: [**Wax**] [**lead**] [**and**] [**corrosion-resistant paint**].

I. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: [**Chrome-plated steel, one piece, flat**] [**Chrome-plated steel, two piece, with 1-inch (25-mm) vertical adjustment**] [**Plastic, white finish, one piece, flat**].
2. Sidewall Mounting: [**Chrome-plated steel**] [**Plastic, white finish**], one piece, flat.

J. Sprinkler Guards:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Reliable Automatic Sprinkler Co., Inc. (The).
b. Tyco Fire & Building Products LP.
c. Victaulic Company.
d. Viking Corporation.
e. <**Insert manufacturer's name**>.

2. Standard: UL 199.
3. Type: Wire cage with fastening device for attaching to sprinkler.

2.8 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Water-Motor-Operated Alarm:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Globe Fire Sprinkler Corporation.
b. Tyco Fire & Building Products LP.
c. Victaulic Company.
d. Viking Corporation.

e. <**Insert manufacturer's name**>.

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. Fire-Lite Alarms, Inc.; a Honeywell International company.
b. Notifier.
c. Potter Electric Signal Company, LLC.
d. <**Insert manufacturer's name**>.

2. Standard: UL 464.
3. Type: Vibrating, metal alarm bell.
4. Size: [**6-inch (150-mm) minimum**] [**8-inch (200-mm) minimum**] [**10-inch (250-mm)**] diameter.
5. Finish: Red-enamel factory finish, suitable for outdoor use.
6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Pressure Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Barksdale, Inc.
b. Detroit Switch, Inc.
c. Potter Electric Signal Company, LLC.
d. System Sensor.
e. Tyco Fire & Building Products LP.
f. United Electric Controls Co.
g. Viking Corporation.
h. <**Insert manufacturer's name**>.

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.

E. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Fire-Lite Alarms, Inc.; a Honeywell International company.
    b. Kennedy Valve Company; a division of McWane, Inc.
    c. Potter Electric Signal Company, LLC.
    d. System Sensor.
    e. <**Insert manufacturer's name**>.

2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.
6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

2.9 MANUAL CONTROL STATIONS

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide" for hydraulic operation, with union, NPS 1/2 (DN 15) pipe nipple, and bronze ball valve.

B. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

2.10 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.

1. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide" when used with thermal detectors and Class A detector circuit wiring.
2. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

B. 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.

C. 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.

D. Panels Components:

1. Power supply.
2. Battery charger.
3. Standby batteries.

4. Field-wiring terminal strip.
5. Electrically supervised solenoid valves and polarized fire-alarm bell.
6. Lamp test facility.
7. Single-pole, double-throw auxiliary alarm contacts.
8. Rectifier.

2.11 PRESSURE GAGES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AGF Manufacturing Inc.
2. AMETEK, Inc.
3. Ashcroft Inc.
4. Brecco Corporation.
5. WIKA Instrument Corporation.
6. <**Insert manufacturer's name**>.

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**] [**0 to 300 psig (0 to 2070 kPa)**].

E. Label: 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

3.1 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.2 SERVICE-ENTRANCE PIPING

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

C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.3 WATER-SUPPLY CONNECTIONS

A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Section 221116 "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 in Section 221119 "Domestic Water Piping Specialties" for backflow preventers.**]

C. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.4 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 (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.

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. In seismic-rated areas, refer to Section 210548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."

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 are not subject to freezing.

P. Drain dry-pipe sprinkler piping.

Q. Pressurize and check dry-pipe sprinkler system piping and [**air-pressure maintenance devices**] [**air compressors**].

R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

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

3.5 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 (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. 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. Steel-Piping, Press-connect Joints: Join schedule 5 to schedule 40 black steel pipe and carbon steel Press-connect fittings.

1. Ream and remove burrs from pipe ends.
2. Prepare pipe surface per manufacturer’s installation instructions.
3. Mark proper insertion depth prior to making press connection.
4. Use tool and jaw/rings recommended by fitting manufacturer.

K. Stainless Steel-Piping, Press Connect Joints: Join Pipe Standard: Stainless steel pipe shall conform to the material requirements of ASTM A 312 or ASTM A 554 and be provided by the fitting manufacturer.

1. Ream and remove burrs from pipe ends.
2. Mark proper insertion depth prior to making press connection.
3. Use tool and jaw/rings recommended by fitting manufacturer.

L. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

M. 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.

N. Copper-Tubing, Press-Connect Joints: Join copper tube and copper or copper alloy press-connect fittings.

1. Ream and remove burrs from pipe ends.
2. Mark proper insertion depth prior to making press connection.
3. Use tool and jaw/rings recommended by fitting manufacturer.

O. 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.

P. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

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. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

D. Specialty Valves:

1. Install valves in vertical position for proper direction of flow, in main supply to system.
2. Install [**dry-pipe**] [**and**] [**deluge**] valves with 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. Install air-pressure maintenance device with 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)**] <**Insert value**> adjustable range; and [**175-psig (1200-kPa)**] <**Insert value**> maximum inlet pressure.
    c. Install compressed-air-supply piping from building's compressed-air piping system.

3.7 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.

3.8 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections[**with the assistance of a factory-authorized service representative**]:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. 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.

B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 CLEANING

A. Clean dirt and debris from sprinklers.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.11 DEMONSTRATION

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

3.12 PIPING SCHEDULE

A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with [**threaded ends, cast-iron threaded fittings, and threaded**] [**grooved ends, grooved-end fittings, grooved-end-pipe couplings, and grooved**] joints.

B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

C. 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**] <**Insert pipe size range**>, shall be[**one of**] the following:

1. [**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
2. [**Standard-weight**] [**Schedule 30**] [**or**] [**thinwall**], 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.
4. [**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with plain ends; carbon steel press-connect fittings.
5. [**Thinwall**] [**Schedule 10**] [**or**] [**hybrid**] black-steel pipe with plain ends; carbon steel press-connect fittings.
6. [**Type L (Type B)**] [**Type M (Type C)**], hard copper tube with plain ends; [**cast-**] [**or**] [**wrought-**]copper, solder-joint fittings; and brazed joints.
7. [**Type L (Type B)**] [**Type M (Type C)**], hard copper tube with plain ends; copper and copper alloy press-connect fittings; and press-connect joints.
8. NPS 2 (DN 50), [**Type L (Type B)**] [**Type M (Type C)**], hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.

E. Standard-pressure, dry-pipe sprinkler system, [**NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**] <**Insert pipe size range**>, shall be[**one of**] the following:

1. [**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
2. [**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.
3. [**Type L (Type B)**] [**Type M (Type C)**], hard copper tube with plain ends; [**cast-**] [**or**] [**wrought-**]copper, solder-joint fittings; and brazed joints.
4. [**Type L (Type B)**] [**Type M (Type C)**], hard copper tube with plain ends; copper and copper alloy press-connect fittings.
5. [**Type L (Type B)**] [**Type M (Type C)**], hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.

F. Standard-pressure, dry-pipe sprinkler system, [**NPS 5 and NPS 6 (DN 125 and DN 150)**] <**Insert pipe size range**>, shall be[**one of**] the following:

1. [**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
2. [**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.
3. [**Type L (Type B)**] [**Type M (Type C)**], hard copper tube with plain ends; [**cast-**] [**or**] [**wrought-**]copper, solder-joint fittings; and brazed joints.
4. [**Type L (Type B)**] [**Type M (Type C)**], hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.

3.13 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: [**Upright sprinklers**] <**Insert type**>.
2. Rooms with Suspended Ceilings: [**Dry pendent sprinklers**] [**Dry recessed sprinklers**] [**Dry flush sprinklers**] [**Dry concealed sprinklers**] [**Dry pendent, recessed, flush, and concealed sprinklers as indicated**].
3. Wall Mounting: Dry sidewall sprinklers.
4. Spaces Subject to Freezing: [**Upright sprinklers**] [**Dry pendent sprinklers**] [**Dry sidewall sprinklers**] [**Upright, dry pendent sprinklers; and dry sidewall sprinklers as indicated**] <**Insert type**>.
5. Special Applications: [**Extended-coverage and quick-response sprinklers where indicated**] <**Insert type**>.

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 211316