SECTION 211300

WATER BASED FIRE SUPPRESSION 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, tube, fittings, and specialties.
2. Backflow preventers.
3. Listed fire-protection valves.
4. Trim and drain valves.
5. Specialty fire-protection pipe fittings.
6. Alarm devices.
7. Pressure gauges.
8. Sprinklers.
9. Fire hose valves.
10. Fire-department inlet connections.
11. Roof manifolds.

1.3 DEFINITIONS

A. High-Pressure System Piping: Water-based fire suppression system piping designed to operate at working pressure higher than standard-pressure 175 psig, but not higher than 250 psig.

B. Standard-Pressure System Piping: Water-based fire suppression system piping designed to operate at working pressure of 175 psig maximum.

1.4 SYSTEM DESCRIPTIONS

A. Sprinkler System Types:

1. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water that is connected to an automatic water supply. Each sprinkler opens when heat from fire melts the sprinkler fusible link or destroys the sprinkler frangible bulb. Water discharges immediately from open sprinklers.

B. Standpipe System Types:

1. Automatic Wet-Type: Standpipe System: A standpipe system normally filled with water and permanently connected to a water supply. System pressure shall be maintained without the need for supplemental pumping by emergency response personnel.

C. Standpipe System Classes:

1. Class I Standpipe System: Includes NPS 2-1/2 hose for fire department use.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. LEED Submittal:

1. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content and chemical components.

C. Shop Drawings: For water-based fire suppression systems. Include plans, elevations, sections, details, and attachments to other work. Include all information required by the applicable NFPA water-based fire suppression standard(s) for “Working Plans”. Comply with Part 3 “Technician Design and Layout”.

1. Hydraulic Calculations: Perform calculations in accordance with applicable NFPA water-based fire suppression Design and Installation Standard(s) for “hydraulic calculations”.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and Certified Engineering Technician.

B. Water Supply Evaluation Report: Include water supply flow test report and Certified Engineering Technician evaluation report confirming adequacy of water supply and significant deviations from historical data or Contract Documents.

C. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA water-based fire suppression system Design and Installation Standards. Include "Contractor's Material and Test Certificate for Aboveground Piping" corresponding to each water-based fire suppression system.

D. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire suppression systems and components to include in emergency, operation, and maintenance manuals.

B. Following submittal of the current Working As-Built drawings for the Demonstration Test and following Building Owner/Client review and approval, the Contractor shall update the Working As-Built drawings as noted in the Building Owner/Client review and to reflect the final as-built configuration. Copy and bind into sets.

C. On the bottom right corner of each drawing sheet, the Contractor shall stamp in red letters 1-inch high, the wording “RECORD DRAWINGS.”

D. The as-built drawings shall be in a final form for submission for final approvals. Once the as-built drawings are approved, the Contractor shall submit three copies and the updated AutoCAD/REVIT files to the Building Owner/Client for distribution.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Personnel licensed by the governing licensing authority for the installation of water-based fire suppression systems. Successfully installed, tested, obtained approvals for, and put into service no less than three (3) water-based fire suppression systems similar in type, size, and complexity to that of the Work of this Section.

2. For CPVC piping installations, personnel certified by the piping manufacturer as an approved installer within the last two (2) years.

B. Certified Engineering Technician Qualifications:

1. Shop Drawings and Calculations prepared by personnel licensed as a Professional Fire Protection Engineer by the governing licensing authority or, where permitted by local authorities having jurisdiction, NICET certified as a Fire Protection, Water-Based Systems Layout Level III or IV Technician.

C. Source Limitations: Obtain products for each product category from a single manufacturer.

D. Product Standards: Listed in the "Fire Protection Equipment Directory" published by UL or the "Approval Guide" published by FM Global.

1. Subject to compliance with requirements, indication of a UL product requirement within Part 2 shall be construed to be inclusive of a corresponding FM Global approved product, with or without UL listing.

E. 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.

1.9 COORDINATION

A. Definition, “Coordinate”: Where Sections of the Work interact, the Contractor responsible for this Section of the Work initiates verbal and/ or written communication with one or more different Contractors responsible for other interacting Sections of the Work for the purposes of establishing a coordinated approach of product selections and installation sequencing that satisfies the individual requirements of the interacting Sections of the Work as well as the requirements of the Work as a whole.

B. Coordinate construction operations with those of other Sections of the Work and other entities to ensure efficient and orderly installation of each part of the Work.

C. Coordinate operations and product selections of this Section with operations and product selections included in different Sections that depend on each other for proper installation, connection, and operation.

D. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

E. Coordinate installation of different components with other Sections of the Work to ensure maximum performance and accessibility for required maintenance, service, and repair.

F. Make adequate provisions to accommodate items scheduled for later installation.

G. Coordination Drawings: Contribute to preparation of Coordination Drawings; indicate water-based fire suppression system Work coordinated with other Sections of the Work.

1.10 MAINTENANCE 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.

2. Custom-finish Sprinklers: Provide a minimum of six spare cover-plates or sprinklers for each custom finish in addition to spares required by NFPA 13.

B. Furnish drain hose assembly for conducting sprinkler drain outlet discharge-to-grade away from building façade and adjacent hard-scape subject to staining; include:

1. Brass hex nipple fitting; furnish one fitting for each drain outlet fitting size used.

2. Brass swivel hose adapter fittings for connection to 2 1/2 in hose coupling; furnish one adapter fitting for each hex nipple outlet size used.

3. Industrial double-jacket EPDM rubber-lined interior / exterior fire hose with hose-coupling ends; 2 1/2 in , 75 ft .

4. Galvanized-steel, wall-mount, hose and coupling storage rack. Mount adjacent to main system riser.

1.11 WARRANTY

A. The Contractor shall guarantee all work from defects in workmanship and inherent mechanical and electrical defects for a period of one (1) year from the date of written acceptance by the Building Owner/Client**.** Warranty shall include Parts and Labor.

B. Upon completion of the installation of the fire suppression systems including Acceptance Testing, Demonstration of existing fire alarm, and delivery of all record submittals and spare parts, the Contractor shall provide the Building Owner/Client with a signed Completion and Warranty Statement, substantially in the form as follows:

1. “The undersigned, having been engaged as the Contractor on the Sommet Blanc Project, confirms that the fire suppression system equipment was installed in accordance with the system manufacturer’s wiring diagrams, installation instructions and technical specifications provided to us by the manufacturer and the Building Owner/Client and that the installed system is warranted for a period of one (1) year effective [insert date of Building Owner/Client acceptance]**.** The warranty includes parts and labor to repair or replace (at the Building Owner/Client discretion) any and all defects in workmanship or inherent electrical and/or mechanical defects.”

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Design and Installation Standard(s):

1. Sprinkler Systems: Comply with NFPA 13.

2. Standpipe Systems: Comply with NFPA 14.

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

C. High-Pressure Piping System Component: Listed for 250 psig minimum working pressure.

D. Seismic Performance: Piping systems shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.2 PIPING APPLICATIONS

A. Comply with Part 3 "Piping Schedule" for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

2.3 STEEL PIPE AND FITTINGS

A. Schedule 40 Steel Pipe: ASTM A 53, A795 or A135; Schedule 40. Pipe ends may be factory or field formed to match joining method.

B. Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795. Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10, plain end.

C. Steel Pipe Nipples: ASTM A 733 steel pipe nipples; made of Schedule 40, ASTM A 53 seamless steel pipe with threaded ends.

D. Steel Pipe Couplings: ASTM A 865 steel couplings; threaded.

E. Threaded Fittings: ASME B16.4, cast-iron threaded fittings, Class 125 and Class 250.

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

G. Cast-Iron Flanges: ASME 16.1, Class 125 and Class 250.

H. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150 and Class 300.

I. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch 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.

3. Pipe-Flange Bolts and Nuts: ASME B18.2.1 carbon steel unless otherwise indicated.

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

1. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

K. Steel Welded Outlet Fittings:

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

a. Anvil International, Inc.

b. Victaulic Company

2. Pressure Rating: 300 psig minimum.

3. Description: UL 213B; forged steel, Schedule 40 wall thickness, with threaded or grooved-end outlet.

L. Grooved-Joint, Steel-Pipe Appurtenances:

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

a. Anvil International, Inc.

b. Tyco Fire & Building Products LP

c. Victaulic Company

2. Pressure Rating: 300 psig minimum.

3. 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.

M. Coatings for Steel Pipe and Fittings: Steel pipe, steel pipe nipples, steel pipe couplings, and threaded fittings factory hot-dipped galvanized.

2.4 CPVC PIPE AND FITTINGS

A. CPVC Pipe: ASTM F 442/F 442M and UL 1821, SDR 13.5, for 175-psig rated pressure at 150 deg F, with plain ends. Include "LISTED" and "CPVC SPRINKLER PIPE" markings.

B. CPVC Fittings: UL listed and FM approved, for 175-psig rated pressure at 150 deg F, socket type. Include "LISTED" and "CPVC SPRINKLER FITTING" markings.

1. NPS 1 to NPS 1-1/2: ASTM F 438 and UL 1821, Schedule 40, socket type.
2. NPS 2 to NPS 3: ASTM F 439 and UL 1821, Schedule 80, socket type.
3. CPVC-to-Metal Transition Fittings: CPVC, one piece, with dimensions equivalent to pipe; one end with threaded brass insert, and one socket end.
4. CPVC-to-Metal Transition Unions: CPVC, with dimensions equivalent to pipe; one end with threaded brass insert, and one socket end.
5. Flanges: CPVC, one or two pieces.

C. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493, solvent cement recommended by pipe and fitting manufacturer, and made for joining CPVC sprinkler pipe and fittings. Include cleaner or primer recommended by pipe and fitting manufacturer.

1. Use solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use adhesive primer that has a VOC content of 650 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 BACKFLOW PREVENTERS

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

1. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
2. Mueller Co.; Water Products Division.
3. Watts Water Technologies, Inc.
4. Zurn Plumbing Products Group; Wilkins Water Control Products Division.

B. Double-Check-Valve-Assembly Backflow Preventers:

1. Standard: UL 1469.
2. Body Material: Bronze for NPS 2 and smaller. Stainless steel for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller. Flanged for NPS 2-1/2 and larger.
4. Configuration: Designed for horizontal, straight through flow.
5. Accessories: Supervised ball valve with threaded ends for NPS 2 and smaller. Supervised UL 262 OS&Y gate valves with flanged ends for NPS 2-1/2 and larger.

2.6 LISTED FIRE-PROTECTION VALVES

A. General Requirements:

1. Isolation valves shall be indicating type and shall include integral or external valve position tamper switches as indicated.
2. Valve -inlets and -outlets shall include plugged threaded taps for the installation of pressure gauges, alarm devices, drains, and similar trim.
3. Iron valves shall include factory applied interior and exterior epoxy coating in compliance with ANSI/AWWA C550 and NSF-61.

B. Bronze Butterfly Valves

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

b. Globe Fire Sprinkler Corporation

c. Milwaukee Valve Company

2. Standard: UL 1091.

3. Minimum Pressure Rating: 175 psig.

4. Body Material: Bronze.

5. Seat Material: EPDM.

6. Stem Material: Bronze or stainless steel.

7. Disc: Bronze or stainless steel with EPDM coating.

8. Actuator: Worm gear or traveling nut with external indicator.

9. Supervisory Switch: Integral to valve actuator.

10. End Connections: Threaded for NPS 1 through NPS 2; grooved for NPS 2-1/2.

C. Iron Butterfly Valves:

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

a. Anvil International, Inc.

b. Tyco Fire & Building Products LP

c. Victaulic Company

2. Standard: UL 1091.

3. Minimum Pressure Rating: 300 psig.

4. Body Material: Cast or ductile iron.

5. Disc: Ductile iron, nickel plated.

6. Actuator: Worm gear or traveling nut with external indicator.

7. Supervisory Switch: Integral to valve actuator.

8. End Connections: Grooved.

D. Iron OS&Y Gate Valves:

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

a. Crane Co.; Crane Valve Group; Stockham Division

b. Milwaukee Valve Company

c. Mueller Co.; Water Products Division

d. NIBCO INC.

e. Watts Water Technologies, Inc.

f. Victaulic Company

2. Standard: UL 262.

3. Minimum Pressure Rating: 300 psig.

4. Body Material: Cast or ductile iron.

5. End Connections: Flanged or grooved.

6. Valve shall be resilient wedge type.

E. Indicator Posts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Crane Co.; Crane Valve Group; Stockham Division
    b. Mueller Co.; Water Products Division
    c. NIBCO INC.
    d. Tyco Fire & Building Products LP
    e. Victaulic Company
2. Standard: UL 789.
3. Orientation: Vertical and horizontal.
4. Body Material: Cast or ductile iron with indicator window, extension rod and locking device.
5. Operation: Hand wheel.

F. Bronze Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Crane Co.; Crane Valve Group; Stockham Division
    b. Milwaukee Valve Company
    c. Mueller Co.; Water Products Division
    d. NIBCO INC.
    e. Watts Water Technologies, Inc.
    f. Victaulic Company
2. Standard: UL 312.
3. Minimum Pressure Rating: 175 psig.
4. Type: Swing check.
5. Body Material: Bronze.
6. End Connections: Threaded.

G. Iron Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Crane Co.; Crane Valve Group; Stockham Division
    b. Milwaukee Valve Company
    c. Mueller Co.; Water Products Division
    d. NIBCO INC.
    e. Watts Water Technologies, Inc.
    f. Victaulic Company
2. Standard: UL 312.
3. Minimum Pressure Rating: 300 psig.

4. Type: Swing check.
5. Body Material: Cast or ductile iron.
6. End Connections: Flanged or grooved.

H. Pressure-Regulating Isolation Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. CLA-VAL Co.
   b. Fire-End & Croker Corp.
   c. Guardian Fire Equipment, Inc.
   d. Potter Roemer Fire Pro.
   e. Zurn Wilkins
2. Standard: UL 1468.
3. Minimum Pressure Rating: 300 psig.
4. Body Material: Brass or bronze.
5. Pattern: Angle or straight.
6. Pressure-Regulating Device: Direct-acting type; field-adjustable.
7. Size: NPS 2-1/2.
8. End Connections: Female pipe threads.
9. Supervision: Include monitor switch adapter.
10. Finish: Rough brass or bronze.

I. Automatic (Ball Drip) Drain Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. AFAC Inc.
   b. Reliable Automatic Sprinkler Co., Inc.
   c. Tyco Fire & Building Products LP
2. Standard: UL 1726.
3. Minimum Pressure Rating: 175 psig.
4. Type: Automatic draining, ball check.
5. Size: NPS 3/4.
6. End Connections: Threaded.

2.7 TRIM AND DRAIN VALVES

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

1. Conbraco Industries, Inc.; Apollo Valves.
2. Fire-End & Croker Corp.
3. Kennedy Valve; a division of McWane, Inc.
4. Milwaukee Valve Company.

5. NIBCO INC.
6. Tyco Fire & Building Products LP.
7. United Brass Works, Inc.
8. Victaulic Company.
9. Watts Water Technologies, Inc.

B. Standard: UL 258.

C. Description: Brass or bronze body ball-, globe-, and angle-valves for fire protection trim and drain applications.

D. Standard-Pressure Applications, Minimum Pressure Rating: 175 psig.

E. High-Pressure Applications, Minimum Pressure Rating: 300 psig.

2.8 SPECIALTY FIRE-PROTECTION PIPE FITTINGS

A. Flexible Sprinkler Connections:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. FlexHead Industries, Inc.
   b. Victaulic Company
2. Standard: UL 1474.
3. Description: Flexible hose for connection to sprinkler, with bracket for connection to ceiling grid, partition framing, or masonry construction. Connection shall be minimum NPS 1 corrugated stainless steel tubing with braided stainless-steel jacket. Assembly shall be UL-listed and FM approved.
4. Minimum Pressure Rating: 175 psig.

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", Category VEOY.
3. Minimum Pressure Rating: 175 psig.
4. Description: Cast- or ductile-iron housing with connected flow switch, pressure gauge, and combination test-and-drain valve fitting; include integral pressure relief valve with discharge connected to assembly drain.
5. End Connections: Threaded and grooved.

C. Test-and-Drain Fittings:

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", Category VEHZ.

3. Minimum Pressure Rating: 175 psig.

4. Description: Brass body 3-position single-handle ball valve with sight glass, discharge test orifice, and integral pressure relief valve with discharge connected to outlet.

5. End Connections: Threaded and grooved.

D. Inspector's Test Fittings:

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", Category VEHZ.

3. Minimum Pressure Rating: 175 psig.

4. Description: Brass body single-handle ball valve with sight glass and discharge test orifice.

5. End Connections: Threaded.

E. Pressure Relief Valves:

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

a. AGF Manufacturing Inc.

b. OCV Control Valves

c. Reliable Automatic Sprinkler Co., Inc.

d. Watts Water Technologies, Inc.

e. Zurn Wilkins

2. Standard: UL 1478A.

3. Minimum Pressure Rating: 175 psig.

4. Description: Brass body with stainless steel spring and flushing handle.

5. End Connections: Threaded.

F. Automatic Air Release Vents:

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

a. AGF Manufacturing Inc.

b. Potter Electric Signal Co., LLC

2. Standard: UL 2573.

3. Minimum Pressure Rating: 175 psig.

4. Description: Brass body automatic air release vent with strainer.

5. End Connections: Threaded.

2.9 ALARM DEVICES

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

1. Potter Electric Signal Co., LLC.

2. System Sensor; a Honeywell Company.

B. General: NEMA enclosure suitable for application, metal cover, 250-psi rated, two sets of SPDT (form C) contacts.

C. Flow Switches: UL 346, paddle type with field adjustable 0-90 second delay adjustment.

D. Pressure Switches: UL 753, field adjustable for operation upon pressure increase or pressure decrease.

E. Tamper Switches: UL 753, mounting brackets suitable for valve type, with normally closed contacts for supervision of valve stem position.

2.10 PRESSURE GAUGES

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

1. AMETEK; U.S. Gauge Division.

2. Ashcroft, Inc.

3. Brecco Corporation.

4. WIKA Instrument Corporation.

B. Standard: UL 393.

C. Dial Size: 3-1/2- to 4-1/2-inch diameter.

D. Pressure Gage Range: 0 to 300 psig.

E. Water System Piping Gauge: Include "WATER" or "AIR/WATER" label on dial face.

F. Air System Piping Gauge: Include "AIR" or "AIR/WATER" label on dial face.

2.11 SPRINKLER APPLICATIONS

A. Comply with drawings.

2.12 SPRINKLERS

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: Brass body automatic sprinklers for fire-protection service; when applicable, listed for use in NFPA 13 Light or Ordinary Hazard occupancies as required by application; minimum K-factor of 5.6.

1. Corrosion Resistant Sprinklers: Stainless steel body, or ENT-plating, or polyester coating; listed as corrosion resistant.

C. Minimum Pressure Rating: 175 psig.

D. Temperature Ratings:

1. Ordinary: 135 deg F to 170 deg F .
2. Intermediate: 175 deg F to 225 deg F .
3. High: 250 deg F to 300 deg F .

E. Standard Spray-Pattern Sprinklers:

1. Standard: UL 199.
2. Frame Styles: Upright, pendent, horizontal-sidewall, vertical-sidewall, concealed pendent, and concealed horizontal-sidewall.
3. Response Characteristics: Quick response (QR) unless standard response (SR) is indicated or otherwise required by application.
4. Concealed Sprinkler Cover-plates: Flat, non-perforated; for ceiling- and wall-mount.
    a. Finishes: Polished chrome-plated, painted, and special application.
    b. Seismic Applications: Oversized to conceal sprinkler ceiling penetration including required 1 inch annular clearance around penetrating sprinkler assembly.
5. Sprinkler Finishes: Brass, polished chrome-plated, and painted.
6. Escutcheons: Single-piece steel; flush and recessed for ceiling- and wall-mount.
    a. Finishes: Polished chrome-plated and painted.

F. Dry-type Sprinklers:

1. Standard: UL 199; standard and extended coverage spray-pattern.
2. Description: Factory-assembled dry-pipe barrel and sprinkler with threaded connection to wet-pipe sprinkle piping.
3. Frame Styles: Upright, pendent, horizontal-sidewall, and concealed pendent.
4. K-factors: 5.6, 8.0, and11.2.
5. Response Characteristics: Quick response (QR) unless standard response (SR) is indicated or otherwise required by application.
6. Concealed Sprinkler Cover-plates: Flat, non-perforated; for ceiling- and wall-mount.
    a. Finishes: Polished chrome-plated, painted, and special application.
7. Sprinkler Finishes: Brass, polished chrome-plated, and painted.
8. Escutcheons: Single-piece steel; flush and recessed for ceiling- and wall-mount.
    a. Finishes: Polished chrome-plated and painted.

G. Residential Spray-Pattern Sprinklers:

1. Standard: UL 1626.
2. Frame Styles: Upright, pendent, horizontal-sidewall, vertical-sidewall, concealed pendent, and concealed horizontal-sidewall.
3. Concealed Sprinkler Cover-plates: Flat, non-perforated; for ceiling- and wall-mount.
    a. Finishes: Polished chrome-plated, painted, and special application.
4. Sprinkler Finishes: Brass, polished chrome-plated, and painted.
5. Escutcheons: Single-piece steel; flush and recessed for ceiling- and wall-mount.

a. Finishes: Polished chrome-plated and painted.

H. Sprinkler Guards:

1. Standard: Listed for use with attached sprinkler.

2. Type: Single-piece, wire cage with fastening device for attachment to sprinkler.

2.13 FIRE HOSE VALVES

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

1. American Fire Hose & Cabinet.

2. Elkhart Brass Mfg. Company, Inc.

3. Fire-End & Croker Corp.

4. Guardian Fire Equipment, Inc.

5. Potter Roemer Fire Pro.

B. Fire Hose Valves, Non-Pressure-Regulating Type:

1. Standard: UL 668.

2. Minimum Pressure Rating: 300 psig.

3. Body Material: Cast brass.

4. Pattern: Angle or straight.

5. Operator: Steel or aluminum hand wheel; powder-coat red finish.

6. Pressure-Regulating Device: None.

7. Size: NPS 1-1/2 or NPS 2-1/2 as indicated.

8. Inlet: Female pipe threads.

9. Outlet: Male hose threads with lugged cap, gasket, and chain. Include hose valve threads according to NFPA 1963 and matching local fire-department threads.

10. Reducer Adapter: NPS 2-1/2 by NPS 1-1/2 with lugged cap and chain.

11. Finish: Rough brass.

C. Fire Hose Valves, Pressure-Regulating Type:

1. Standard: UL 668.

2. Minimum Pressure Rating: 300 psig.

3. Body Material: Cast brass.

4. Pattern: Angle or straight.

5. Operator: Steel or aluminum hand wheel; powder-coat red finish.

6. Pressure-Regulating Device: UL 1468 direct-acting type; factory-set, non-adjustable.

7. Size: NPS 1-1/2 or NPS 2-1/2 as indicated.

8. Inlet: Female pipe threads.

9. Outlet: Male hose threads with lugged cap, gasket, and chain. Include hose valve threads according to NFPA 1963 and matching local fire-department threads.

10. Reducer Adapter: NPS 2-1/2 by NPS 1-1/2 with lugged cap and chain.

11. Finish: Rough brass.

2.14 FIRE-DEPARTMENT INLET CONNECTIONS

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

1. American Fire Hose & Cabinet.
2. Elkhart Brass Mfg. Company, Inc.
3. Fire-End & Croker Corp.
4. Guardian Fire Equipment, Inc.
5. Potter Roemer Fire Pro.

B. Standard: UL 405.

C. Minimum Pressure Rating: 300 psig.

D. Body Material: Cast brass.

E. Connection Style: Vertical NHS**,** free-standing.

F. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.

G. Caps: Brass, lugged type, with gasket and chain.

H. Escutcheon: Brass; with brass pipe sleeve for free-standing applications.

I. Escutcheon Marking: Similar to "AUTO SPKR & STANDPIPE" as approved by authority having jurisdiction.

J. Exposed Parts Finish: Rough brass.

2.15 ROOF MANIFOLDS

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

1. American Fire Hose & Cabinet.
2. Elkhart Brass Mfg. Company, Inc.
3. Fire-End & Croker Corp.
4. Guardian Fire Equipment, Inc.
5. Potter Roemer Fire Pro.

B. Standard: UL 405.

C. Minimum Pressure Rating: 175 psig.

D. Body Material: Cast brass.

E. Pattern: Angle or straight.

F. Outlets: Threaded-male for attachment UL 668 fire hose valve; include capped fire hose valve at each outlet.

G. Caps: Brass, lugged type, with gasket and chain.

H. Escutcheon: Brass.

I. Escutcheon Marking: Similar to "HYDRANT" as approved by authority having jurisdiction.

J. Exposed Parts Finish: Rough brass.

2.16 FIRE TANK AUTOMATIC FILL VALVES

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

1. Bermad
2. Claval
3. Watts

B. General: UL listed float operated automatic fill valve with exterior float assembly that can be serviced without having to enter tank.

C. Water level monitoring: Provide electronic water level monitoring system that provides high level and low level alarms to be supervised by building fire alarm system.

PART 3 - EXECUTION

3.1 PREPARATION

A. Schedule and conduct water supply flow tests promptly to establish available water supply flow and pressure characteristics.

B. Schedule and sequence water supply flow tests and Shop Drawing preparation such that the flow test date is no more than twelve (12) months prior to the Shop Drawing submittal date.

C. Tests shall be conducted during time of seasonal and daily peak demand based upon review with local water authority.

1. Where testing during time of peak demand is not permitted or feasible, obtain historical data regarding seasonal and daily system pressure variations from local water authority.

3.2 TECHNICIAN DESIGN AND LAYOUT

A. General:

1. Roles and responsibilities shall be as set forth in NSPE Position Statement No. 1749 “SFPE/NSPE/NICET Joint Position of the Engineer and the Engineering Technician Designing the Fire Protection System”, available at nspe.org. As applied to the Work, the Contract Documents have been prepared by the “Engineer” and Shop Drawings required by this Section of the Work are prepared by the “Certified Engineering Technician”.

2. As the Certified Engineering Technician, prepare Shop Drawings indicating system layout and sizing in accordance with the requirements of the Contract Documents, including but not limited to:

a. Evaluation of water supply adequacy.

b. Detailed sizing and layout of piping and appurtenances including feed-mains, risers, cross mains, branch lines, valves, drainage provisions, hangers, restraints, supports, and similar.

c. Detailed sprinkler layouts.

d. Hydraulic calculations.

e. Installation details for the specific equipment being furnished.

B. Design and Installation Standard(s): Comply with Part 2 Article “Performance Requirements”.

a. Comply with the performance requirements indicated by the Contract Documents where such requirements are more stringent than those of the Design and Installation Standard(s); otherwise, comply with the performance requirements of the Design and Installation Standard(s).

C. Design and layout fire suppression piping to satisfy performance requirements:

1. Rectilinear fire suppression piping arrangement with respect to building partitions and structural elements.
2. Concealed fire suppression piping installation throughout finished spaces and maximum headroom beneath exposed fire suppression piping in areas exposed to structure above.
3. No fire suppression piping within electrical, information technology, or similar spaces other than branch piping serving sprinklers protecting such electrical, information technology, or similar space spaces.
4. No fire suppression piping directly above electrical equipment, electrical panels, information technology equipment, or similar energized equipment.
5. No fire suppression piping within exit enclosures except standpipes supplying hose valves within the exit enclosure, sprinkler zone control assemblies and piping immediately downstream, branch piping supplying sprinklers within the exit enclosure, and associated drain connections and risers.
6. No fire suppression piping within or in proximity to hazardous materials storage or processing operations other than branch piping serving sprinklers protecting such hazardous materials storage or processing operations.
7. Fire suppression piping supported from primary building structural elements or approved supplemental supports capable of supporting the attached load.
8. Fire suppression piping crossing building expansion joints provided with expansion fittings appropriate to the joint design deflection value.
9. Fire suppression feed-main, standpipe, and system riser piping supplied by fire pumps rigidly restrained against movement resulting from pump-induced system pressure increases and water velocity induced forces.
10. Fire suppression piping protected against damage where subject to earthquakes.
11. Fire suppression piping protected against damage where subject to freezing without the use of heat-trace cables unless indicated otherwise.
12. Fire suppression piping arranged such that piping drains back to main drains and drain risers without the use of auxiliary drains.
13. Fire suppression drain risers, system riser main-drain piping and other equipment drains discharge at a safe location outside the building or at an approved, adequately sized interior drain receptacle if outside discharge is not feasible.

D. Design and layout sprinklers to satisfy performance requirements:

1. Sprinklers located to provide automatic sprinkler protection throughout as required by the Contract Documents and the requirements of the Design and Installation Standards.
    a. Comply with graphic sprinkler layouts and narrative layout parameters indicated by the Contract Documents. Where sprinkler layouts or layout parameters are not indicated by the Contract Documents, comply with Design and Installation Standard(s).
2. Sprinklers located according to the per-sprinkler protection area limitations corresponding to the protected occupancy hazard and construction type.
3. Sprinklers within finished-spaces flush or recessed mount as indicated; located in the center of suspended ceiling tiles, along the center-line of ceiling features, and in-line with adjacent ceiling fixtures.
4. Sprinklers located with respect to structural members and construction type and beam pocket arrangement within spaces exposed to structure above.

5. Sprinklers located with respect to obstructions to sprinkler discharge; considering all obstructions such as ductwork, piping, lighting, cable trays, floating ornamental ceilings, and similar.

    a. Sprinkler protection provided above and below such obstructions where protection cannot be provided in accordance with the Design and Installation Standards via sprinklers located solely above or below obstructions.

6. Sprinklers located within construction voids or enclosed spaces that do not meet the NFPA 13 definition of concealed spaces due to openings or similar features.

E. Hydraulically design water-based fire suppression system piping using the Hazen-Williams or Darcy-Weisbach formulas in accordance with the Design and Installation Standard(s).

1. Sprinkler System Occupancy Hazard and Discharge Criteria: Comply with criteria indicated by Drawings as approved by authorities having jurisdiction.

    a. Calculation areas shall not be reduced for quick response sprinkler applications.

2. Standpipe System Flow and Pressure Criteria: Comply with criteria indicated by Drawings as approved by authorities having jurisdiction.

3. Margin of Safety Between Available and Required Pressure at Design Flowrate: 10 psi minimum, including losses through water-service piping, valves, and backflow preventers.

4. For fire pump applications, submit fire pump product data including manufacturer’s characteristic pump curve prior to preparing hydraulic calculations.

    a. Use flow and pressure data points from the submitted manufacturer's characteristic fire pump curve when preparing hydraulic calculations.

5. For direct-acting pressure regulating valve applications, include manufacturer's pressure loss chart and indicate the calculated flow through the valve and resulting pressure loss.

6. For applications with system pressures greater than 175 psig, prepare a calculation at maximum static pressure to identify building floor elevations requiring pressure regulating valves.

    a. Riser Diagram: Indicate maximum static pressure at each floor elevation, including inlet and outlet pressure at pressure regulating valves where provided.

7. Include pressure losses associated with specialty fittings and assemblies such as seismic separation assemblies and flexible sprinkler connections.

F. Hydraulic Calculations for Feed Main Piping and Standpipes:

1. Feed mains and standpipes upstream of zone control and riser valve assemblies shall be no smaller than as indicated by the Drawings.

2. Standpipe hydraulic calculations shall include the listed pressure loss for NPS 2-1/2 angle-pattern fire hose valves per the associated product data sheet.

3. Automatic Standpipe Systems: include calculations demonstrating compliance with performance criteria using automatic water supply and separate calculations demonstrating compliance using fire department pumper truck supply via most remote inlet connection.

G. Hydraulic Calculations for Sprinkler Piping:

1. Sprinkler mains including zone control and riser valve assemblies shall be no smaller than as indicated by the Drawings.

    a. Hydraulically determine pipe sizes for sprinkler branch piping.

2. Sprinkler zone control and riser valve assemblies shall be no smaller than as indicated by the Drawings.

a. Hydraulically determine pipe sizes for sprinkler piping downstream of zone control assemblies.

3. Where sprinkler systems are supplied by two (2) risers, pipe sizing shall be based upon supply from the hydraulically most remote riser only.

4. Include additional hydraulic calculations as required when the hydraulically most remote area is not clear (not the geometrically most remote).

5. Do not utilize NFPA 13 area reduction for quick response sprinklers unless otherwise indicated.

H. Flexible Sprinkler Connections:

1. Hydraulic Calculations: Include pressure losses through flexible sprinkler connections. Indicate installation parameters for maximum hose length, maximum bend radius, maximum quantity of bends, and fitting patterns associated with the calculated pressure loss.

2. Shop Drawings: Include locations of flexible sprinkler connections with limiting installation parameters as determined via hydraulic calculations clearly indicated.

3.3 ON-SITE AS-BUILT DRAWINGS

A. As work progresses and for the duration of the construction operations, maintain complete and separate set of prints of Shop Drawings (Working Plans) at project site at all times. Record work completed and all deviations from reviewed Shop Drawings (Working Plans) clearly and accurately. Include actual locations of existing utilities if they differ from design documents. Record valve tag designations as installed.

3.4 EXAMINATION

A. Examine sleeved penetrations through concrete and structural penetrations through steel and verify that they are suitable for intended piping installation.

B. Examine walls and partitions and verify that they are suitable for installation of piping, cabinets, inlet connections and similar products.

C. Examine areas to contain standpipe hose outlets including stairwells and vestibules and verify that door swings or other obstructions will not interfere with the installation or future operation of hose valves.

D. Report conflicts with proposed solutions. Proceed with installation after conflicts have been resolved.

3.5 SERVICE-ENTRANCE PIPING

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

B. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

C. Flush service piping to a minimum velocity of 10 ft/sec prior to connecting to sprinkler system.

3.6 WATER-SUPPLY CONNECTIONS

A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Division 22 for domestic water piping."

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

C. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

3.7 PIPING INSTALLATION

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

1. Deviations from approved Shop Drawings require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

B. Piping Standard: Comply with requirements for installation of piping in NFPA 13 and NFPA 14.

C. Install hangers and supports: Comply with Division 21 for common work results for fire suppression.

D. Install seismic restraints and flexible couplings. Comply with Division 21 for seismic controls for fire suppression piping and equipment.

E. Install provisions to accommodate building expansion joints. Provide for expansion at building expansion joints with assemblies listed for that purpose. Coordinate the maximum value of building deflection with the appropriate Structural Section of the Work.

F. Install sleeves, sleeve-seals, fire-stopping, and pipe escutcheons. Comply with Division 21 for common work results for fire suppression.

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

1. Hole-Cut Fittings: Where used, use two-piece cast type fittings only; fittings utilizing straps, U-bolts, or similar are not permitted.

H. Install unions adjacent to each valve in pipes NPS 2 and smaller.

I. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

J. Install water-based fire suppression piping with drains for complete system drainage.

K. Install water-based fire suppression piping such that piping drains back to main drains and drain risers without the use of auxiliary drains.

L. Pipe drain risers, system riser main drain piping and other equipment drains to discharge at a safe location outside the building or at an approved interior drain receptacle if outside discharge is not feasible.

M. Use threaded-end galvanized-iron 45-degree elbow with galvanized-iron wall plate for exterior drain outlet terminations at building exterior. Threads shall match drain hose adapter and coupling required under Part 1 Article “Extra Materials”.

N. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

O. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

P. Install alarm devices in piping systems.

Q. Install automatic air release vents.

R. Install pressure gages at locations indicated and as required by the Design and Installation Standards. Include pressure gages with connection not less than NPS 1/4 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.

S. With air release vents in service, fill water-based fire suppression system piping with water.

3.8 CPVC PIPING INSTALLATION

A. Install CPVC piping in concealed locations in accordance with listing requirements.

B. Do not install CPVC piping over ceiling openings including but not limited to return air grills.

C. Use through-penetration protection assemblies listed for use with CPVC piping.

D. Install CPVC piping to accommodate thermal expansion and contraction. Piping deformed due to thermal expansion or contraction shall be removed and replaced with new.

E. Provide hangers and supports in accordance with CVPC piping listing requirements and NFPA 13. Provide additional hangers and supports as required to ensure piping is installed flat or pitched to drains.

F. CPVC piping joints shall be properly cured prior to system hydrostatic testing. Provide adequate cure time in low temperature conditions in accordance with manufacturer's requirements.

G. Remove trapped air from CPVC piping as it is filled with water. Air shall be removed from piping prior to hydrostatic testing or putting system into service.

H. Provide additional valves, fittings and piping as required for removal of trapped air in CPVC piping. Indicate locations of air removal valves and fittings on Shop Drawings and Record Drawings.

I. Protect CPVC piping from physical damage in accordance with manufacturer's requirements where run through metal studs.

J. Store CPVC pipe and fittings in accordance with manufacturer's recommendations. Protect CPVC piping from exposure to direct sunlight, oils, and heat sources. Do not store CPVC pipe fittings with metal fittings.

3.9 JOINT CONSTRUCTION

A. Comply with Div. 21 "Common Work Results for Fire Suppression".

3.10 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to the Design and Installation Standards 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 valves in locations that are readily accessible. Install system control valves in areas that allow for safe fire department access during emergency conditions.

D. Install indicating valves such that indicator is clearly visible from the floor level below.

E. Pipe pressure relief valve- and air release fitting-discharge to sprinkler drain risers.

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

G. Install alarm valves in vertical position unless otherwise indicated.

H. Install alarm valve trim sets for drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

3.11 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels with no visible deviation.

B. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Install dry-type sprinklers with water supply from heated space.

C. Where pendent sprinklers are indicated for dry-pipe or preaction sprinkler systems, use dry-type sprinklers.

D. Piping used for sprinkler connection return-bends, drop-nipples, and riser-springs shall be no smaller than NPS 1.

E. Supply pendent sprinklers using a return-bend piping arrangement with connection at the top of the branch pipe to prevent the accumulation of piping corrosion, scale, and sediment at the sprinkler.

F. Install sprinklers such that cover plate or escutcheon is flush and uniform with respect to penetrated ceiling or wall finish and complies with manufacturer installation requirements. Correct sprinklers that are not flush by adjusting them in accordance with the manufacturer's instructions and/or re-installing sprinklers.

1. Adjustable sprinkler drop nipples are not permitted.

G. Install sprinklers in accordance with the requirements of NFPA 13 regarding obstructions to sprinkler discharge. Consider all obstructions such as structural elements, ductwork, piping, lighting, cable trays, and floating ornamental ceilings. Adjust sprinkler locations and/or add sprinklers as a Unit-Cost Allowance where installations are not coordinated and obstructions cannot be relocated to accommodate sprinklers as installed.

1. Coordinate the installation of solid barriers beneath "non flat", "non solid", or "non continuous" obstructions required by FM Global with the Construction Manager.

H. Provide and install guards on sprinklers susceptible to mechanical damage. At a minimum provide guards for pendent and upright sprinklers located in the following locations: electrical rooms and closets, near adjacent to ceiling mounted equipment requiring maintenance, beneath obstructions such as ductwork or catwalks, walk-in freezers or cold rooms, and beneath stair landings.

I. Where not provided under other Sections of the Work, provide and install non-combustible baffles between sprinklers less than 6 feet apart to prevent cold-soldering.

3.12 INSTALLATION OF FLEXIBLE SPRINKLER CONNECTIONS

A. Install flexible sprinkler connections in accordance with manufacturer's recommendations.

B. Install each flexible sprinkler connection according to the criteria and limitations established by the submitted Product Data, Shop Drawings and Hydraulic Calculations with respect to quantity and type of fitting connections, maximum hose length, maximum quantity of bends, and minimum bend radius.

C. Branch connections shall be made a minimum 45 degrees from horizontal. Where connections from the side or bottom of branch are required due to coordination, locations shall be clearly indicated or shop drawings and approved by the Engineer.

3.13 FIRE HOSE VALVE INSTALLATION

A. Install fire hose valves in readily accessible locations and with sufficient operational clearances for connection of fire hose and operation of valve handwheel.

1. Do not locate fire hose valves such that require the operator to stand within a door-swing path or similar obstruction or hazard.
2. Install exposed fire hose valves orientated to minimize projection into adjacent walking surfaces.

B. Install fire hose valves in cabinets where indicated. Include pipe escutcheons with finish matching valves and firestopping if required.

1. Coordinate with Division 10 requirements for “Fire Protection Cabinets”.

C. Install NPS 2-1/2 fire hose valves with quick-disconnect NPS 2-1/2 by NPS 1-1/2 reducer adapter.

3.14 FIRE-DEPARTMENT CONNECTION INSTALLATION

A. Install fire department connections in readily accessible with sufficient operational clearances for connection of fire hoses.

B. Install fire department inlet connections such that they are readily visible from the roadway or accessway designated for fire department pumper apparatus access.

C. Coordinate locations of fire department inlet locations with locations of Division 28 exterior waterflow alarm bells such that bells are adjacent to connections.

D. Install automatic (ball drip) drain valve at each check valve for fire department inlet connection, to drain piping between fire department inlet connection and check valve. Install drain piping to and spill over floor drain or to outside building; drain piping to stone dry-well for free-standing connection applications.

3.15 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to Division 21 for identification for fire suppression piping and equipment.

3.16 FIELD QUALITY CONTROL

A. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.

B. Flush, test, and inspect standpipe hose valve systems according to NFPA 14, "Systems Acceptance" Chapter.

C. Hydrostatically test system piping in accordance with the applicable NFPA water-based fire suppression system design and installation standards. Repair leaks and retest until no leaks exist.

D. Inspect system components in accordance with the applicable NFPA water-based fire suppression system Design and Installation Standards. Adjust settings or replace damaged or malfunctioning components and retest until proper operation is achieved.

E. Inspect and adjust alarm and delay settings of alarm devices.

F. Inspect and adjust alarm valve trim settings.

G. Inspect and adjust pressure relief valves such that no water is discharged under normal system working conditions.

H. Inspect and adjust each field adjustable direct acting pressure regulating valve in accordance with the manufacturer’s recommendations.

1. Adjust standpipe fire hose valves in accordance with the minimum and maximum pressure requirements indicated in NFPA 14.

2. Adjust sprinkler system regulating devices in accordance with the maximum pressure requirements of NFPA 13 and the minimum pressure requirements as indicated by hydraulic calculations.

I. Verify that equipment hose threads are same as local fire-department equipment.

J. Functionally test water-based fire suppression systems, including required full-flow tests, in accordance with the applicable NFPA water-based fire suppression system Design and Installation Standards. Combine tests to conserve water. Correct deficiencies and retest satisfactory results are achieved.

K. Conduct backflow preventer forward-flow tests.

L. Conduct main-drain tests.

M. Conduct standpipe flow tests; automatic and manual operation.

N. Conduct pressure-regulating valve flow tests.

O. Coordinate with fire-pump tests. Operate as required.

P. Coordinate with fire-alarm tests. Operate as required.

Q. Water-based fire suppression system will be considered defective if it does not pass tests and inspections.

R. Prepare test and inspection reports. Use NFPA “Contractor’s Material and Test Certificate” format.

3.17 CLEANING

A. Clean dirt and debris from system components including backflow preventers, listed fire protection valves, trim and drain valves, specialty fittings, alarm devices, pressure gauges, air compressors, and nitrogen generators.

B. Clean dirt and debris from hose valves and specialties.

C. Clean dirt, debris from sprinklers. Remove and replace sprinklers with paint other than factory finish or similar.

D. Clean dirt and debris from fire department inlet and outlet connections.

3.18 DEMONSTRATION

A. Train Owner’s maintenance personal to adjust, operate, and maintain water-based fire suppression systems; including the following:

1. NFPA 25 inspection, testing, and maintenance activities and frequencies.

2. Location and function of system isolation valves.

3. Location and function of system drain valves and test valves.

4. Location of drain discharge outlets and procedure for connection of exterior drain hose.

5. Location and contents of spare sprinkler cabinet and procedure for emergency replacement of sprinkler.

6. Procedure for conducting backflow preventer forward-flow tests.

7. Procedure for conducting main-drain flow tests.

8. Procedure for conducting sprinkler waterflow alarm tests.

9. Procedure for conducting fire hose valve standpipe flow tests.

10. Procedure for conducting pressure-regulating valve flow tests.

B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the following:

1. Wet-pipe, dry-pipe, and deluge alarm valves.
2. Air compressors and nitrogen-purge generators.

3.19 PIPING SCHEDULE

A. Refer to Drawings.

3.20 SPRINKLER SCHEDULE

A. Refer to Drawings.

END OF SECTION

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