

SECTION 21 0517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

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. Sleeves
- 2. Grout
- 3. Silicone sealants

- B. Related Sections:

- 1. Section 210518 “Escutcheons for Fire-Suppression Piping”
- 2. Section 210523 “General Duty Valves for Fire Protection Piping”
- 3. Section 210529 “Hangers and Supports for Fire Suppression Piping and Equipment”
- 4. Section 210553 “Identification for Fire-Suppression Piping and Equipment”
- 5. Section 211313 “Wet-Pipe Sprinkler Systems”

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Galvanized Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, with plain ends and integral welded waterstop collar.
- B. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.

2.2 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Non-shrink; recommended for interior and exterior applications.

- C. Design Mix: **5000-psi**, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.3 SILICONE SEALANTS

- A. Silicone, S, NS, 25, NT: Single-component, non-sag, plus 25 percent and minus 25 percent movement capability, non-traffic use, neutral-curing silicone joint sealant, ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation
 - b. GE Construction Sealants
 - c. Polymeric Systems, Inc.
 - d. Schnee-Morehead, Inc., an ITW Company
 - e. The Sherwin-Williams Company
- B. Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic and non-traffic use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT. Grade P Pourable (self-leveling) formulation is for opening in floors and other horizontal surfaces that are not fire rated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. May National Associates, Inc., A subsidiary of Sika Corporation

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide **1-inch** annular clear space between piping and concrete slabs and walls.
 - 1. Sleeves are not required for core-drilled holes in concrete.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 - 2. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas **2 inches** above finished floor level.

3. Using grout or silicone sealant, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
1. Cut sleeves to length for mounting flush with both surfaces.
 2. Install sleeves that are large enough to provide **1/4-inch** annular clear space between sleeve and pipe.
 3. Seal annular space between sleeve and piping; use joint sealants appropriate for size, depth, and location of joint.
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078400 "Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 FIELD QUALITY CONTROL

- A. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.
- B. Prepare test and inspection reports.

3.4 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than **NPS 6**: Galvanized-steel pipe sleeves.
 2. Interior Partitions:
 - a. Piping Smaller Than **NPS 6**: Galvanized-steel-pipe sleeves or PVC pipe sleeves.

END OF SECTION

SECTION 21 0518 - ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING

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. Escutcheons.

- B. Related Sections:

- 1. Section 210517 “Sleeves and Sleeve Seals for Fire-Suppression Piping”
- 2. Section 210523 “General Duty Valves for Fire Protection Piping”
- 3. Section 210529 “Hangers and Supports for Fire Suppression Piping and Equipment”
- 4. Section 210553 “Identification for Fire-Suppression Piping and Equipment”
- 5. Section 211313 “Wet-Pipe Sprinkler Systems”

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. BrassCraft Manufacturing Co., A Masco company
 - 2. Dearborn Brass
 - 3. Jones Stephens Corp.
 - 4. Keeney Manufacturing Company
 - 5. Mid-America Fittings, Inc.
 - 6. ProFlo; a Ferguson Enterprises, Inc. brand

2.2 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.
- D. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls where exposed below ceilings or in areas with no ceiling, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - c. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - d. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass or split-casting brass type with chrome-plated finish.
 - e. Bare Piping in Equipment Rooms: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.

3.2 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION

SECTION 210523 - GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING

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. Two-piece ball valves with indicators.
2. Check valves.
3. Bronze OS&Y gate valves.
4. Iron OS&Y gate valves.
5. NRS gate valves.
6. Trim and drain valves.

- B. Related Sections:

1. Section 210517 “Sleeves and Sleeve Seals for Fire-Suppression Piping”
2. Section 210518 “Escutcheons for Fire-Suppression Piping”
3. Section 210529 “Hangers and Supports for Fire Suppression Piping and Equipment”
4. Section 210553 “Identification for Fire-Suppression Piping and Equipment”
5. Section 211313 “Wet-Pipe Sprinkler Systems”

1.3 DEFINITIONS

- A. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- B. NRS: Non-rising stem.
- C. OS&Y: Outside screw and yoke.
- D. SBR: Styrene-butadiene rubber.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooved ends, and weld ends.
 - 3. Set valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.
- D. Protect flanges and specialties from moisture and dirt.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. UL Listed: Valves shall be listed in UL's "Online Certifications Directory" under the headings listed below and shall bear UL mark:
 - 1. Main Level: HAMV - Fire Main Equipment.
 - a. Level 1: HLOT - Valves.
 - 1) Level 3: HLUG - Ball Valves, System Control.
 - 2) Level 3: HLXS - Butterfly Valves.
 - 3) Level 3: HMER - Check Valves.
 - 4) Level 3: HMRZ - Gate Valves.
 - 2. Main Level: VDGT - Sprinkler System & Water Spray System Devices.
 - a. Level 1: VQGU - Valves, Trim and Drain.
- B. FM Global Approved: Valves shall be listed in its "Approval Guide," under the headings listed below:
 - 1. Automated Sprinkler Systems:
 - a. Indicator posts.
 - b. Valves.
 - 1) Gate valves.
 - 2) Check valves.
 - a) Single check valves.

3) Miscellaneous valves.

- C. Source Limitations for Valves: Obtain valves for each valve type from single manufacturer.
- D. ASME Compliance:
 - 1. ASME B16.1 for flanges on iron valves.
 - 2. ASME B1.20.1 for threads for threaded-end valves.
 - 3. ASME B31.9 for building services piping valves.
- E. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.
- F. NFPA Compliance: Comply with NFPA 24 for valves.
- G. Valve Pressure Ratings: Not less than the minimum pressure rating indicated or higher as required by system pressures.
- H. Valve Sizes: Same as upstream piping unless otherwise indicated.
- I. Valve Actuator Types:
 - 1. Handwheel: For other than quarter-turn trim and drain valves.
 - 2. Handlever: For quarter-turn trim and drain valves NPS 2 and smaller.

2.2 TWO-PIECE BALL VALVES WITH INDICATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Globe Fire Sprinkler Company
 - 2. NIBCO INC.
 - 3. Victaulic Company.
- B. Description:
 - 1. UL 1091, except with ball instead of disc and FM Global standard for indicating valves (ball type), Class Number 1112.
 - 2. Minimum Pressure Rating: 300 psig.
 - 3. Body Design: Two piece.
 - 4. Body Material: Forged brass or bronze.
 - 5. Port Size: Full.
 - 6. Seats: PTFE.
 - 7. Stem: Bronze or stainless steel.
 - 8. Ball: Chrome-plated brass.
 - 9. Actuator: Weatherproof housing with worm gear or traveling nut.
 - 10. Supervisory Switch: Internal or external.
 - 11. End Connections for Valves NPS 1 through NPS 2: Threaded or grooved ends.
 - 12. End Connections for Valves NPS 2-1/2: Grooved ends.

2.3 CHECK VALVES

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

1. Anvil International, Inc.
2. Globe Fire Sprinkler Company
3. NIBCO INC.
4. Reliable Automatic Sprinkler Co., Inc.
5. Tyco Fire & Building Products LP.
6. Victaulic Company.
7. Viking Corporation.
8. Watts Water Technologies, Inc.

B. Description:

1. Standard: UL 312 and FM Global standard for swing check valves, Class Number 1210.
2. Minimum Pressure Rating: 250 psig.
3. Type: Single swing or spring assisted check, suitable for vertical or horizontal installation.
4. Body Material: Cast iron, ductile iron, or bronze.
5. Clapper: Bronze, ductile iron, or stainless steel with elastomeric seal.
6. Clapper Seat: Brass, bronze, welded-in nickel, or stainless steel.
7. Hinge Shaft: Bronze or stainless steel.
8. Hinge Spring: Stainless steel.
9. End Connections: Flanged, grooved, or threaded.

2.4 BRONZE OS&Y GATE VALVES

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

1. Milwaukee Valve Company.
2. NIBCO INC.
3. United Brass Works, Inc.

B. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig.
3. Body and Bonnet Material: Bronze or brass.
4. Wedge: One-piece bronze or brass.
5. Wedge Seat: Bronze.
6. Stem: Bronze or brass.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Threaded.

2.5 IRON OS&Y GATE VALVES

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

1. Globe Fire Sprinkler Company
2. Kennedy Valve; a division of McWane, Inc.
3. Mueller Co.; Water Products Division.
4. NIBCO INC.
5. Victaulic Company.
6. Watts Water Technologies, Inc.

B. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 250 psig.
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron, or bronze with elastomeric coating.
5. Wedge Seat: Cast or ductile iron, or bronze with elastomeric coating.
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.

8. Supervisory Switch: External.
9. End Connections: Flanged or Grooved.

2.6 NRS GATE VALVES

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

1. Globe Fire Sprinkler Company
2. Kennedy Valve; a division of McWane, Inc.
3. Mueller Co.; Water Products Division.
4. NIBCO INC.
5. Victaulic Company.

B. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 250 psig.
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron with elastomeric coating.
5. Wedge Seat: Cast or ductile iron, or bronze with elastomeric coating.
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.

8. Supervisory Switch: External.
9. End Connections: Flanged or Grooved.

2.7 TRIM AND DRAIN VALVES

A. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire Protection Products, Inc.
 - b. Globe Fire Sprinkler Company
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Potter Roemer.
 - f. Tyco Fire & Building Products LP.
 - g. Victaulic Company.
 - h. Watts Water Technologies, Inc.
2. Description:
 - a. Pressure Rating: 175 psig
 - b. Body Design: Two piece.
 - c. Body Material: Forged brass or bronze.
 - d. Port size: Full.
 - e. Seats: PTFE.
 - f. Stem: Bronze or stainless steel.
 - g. Ball: Chrome-plated brass.
 - h. Actuator: Handlever.
 - i. End Connections for Valves NPS 1 through NPS 2-1/2: Threaded ends.
 - j. End Connections for Valves NPS 1-1/4 and NPS 2-1/2: Grooved ends.

B. Angle Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire Protection Products, Inc.
 - b. NIBCO INC.
 - c. United Brass Works, Inc.
2. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Material: Brass or bronze.
 - c. Ends: Threaded.
 - d. Stem: Bronze.
 - e. Disc: Bronze.
 - f. Packing: Asbestos free.
 - g. Handwheel: Malleable iron, bronze, or aluminum.

C. Globe Valves:

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

- a. NIBCO INC.
 - b. United Brass Works, Inc.
2. Description:
- a. Pressure Rating: 175 psig.
 - b. Body Material: Bronze with integral seat and screw-in bonnet.
 - c. Ends: Threaded.
 - d. Stem: Bronze.
 - e. Disc Holder and Nut: Bronze.
 - f. Disc Seat: Nitrile.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Examine grooved ends for form and cleanliness. Ends shall be clean and free from indentations and projections in the area from valve end to (and including) the groove.
- F. Do not attempt to repair defective valves; replace with new valves.

3.2 GENERAL REQUIREMENTS FOR VALVE INSTALLATION

- A. Comply with requirements in the following Sections for specific valve installation requirements and applications:
 1. Section 211313 "Wet-Pipe Sprinkler Systems" for application of valves in wet-pipe, fire-suppression sprinkler systems.
- 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. Install valves having threaded connections with unions at each piece of equipment arranged to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.
- E. Install valves in horizontal piping with stem at or above the pipe center.
- F. Install valves in position to allow full stem movement.
- G. Butterfly valves are not acceptable for shut-off duty.
- H. Install valve tags. Comply with requirements in Section 210553 "Identification for Fire-Suppression Piping and Equipment" for valve tags and schedules and signs on surfaces concealing valves; and the NFPA standard applying to the piping system in which valves are installed. Install permanent identification signs indicating the portion of system controlled by each valve.

END OF SECTION

SECTION 210529 - HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

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. Metal pipe hangers and supports.
- 2. Fastener systems.
- 3. Equipment supports.

- B. Related Sections:

- 1. Section 210517 “Sleeves and Sleeve Seals for Fire-Suppression Piping”
- 2. Section 210518 “Escutcheons for Fire-Suppression Piping”
- 3. Section 210523 “General Duty Valves for Fire Protection Piping”
- 4. Section 210553 “Identification for Fire-Suppression Piping and Equipment”
- 5. Section 211313 “Wet-Pipe Sprinkler Systems”

- C. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

- 1. Metal framing systems.
- 2. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.
- B. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer licensed in the State of Georgia, as defined in Section 014000 "Quality Requirements," to design trapeze pipe hangers and equipment supports.
- B. Structural Performance: Hangers and supports for fire-suppression piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. NFPA Compliance: Comply with NFPA 13.
- D. UL Compliance: Comply with UL 203.

2.2 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: Factory-fabricated components, NFPA approved, UL listed, or FM approved for fire-suppression piping support.
 - 2. Galvanized Metallic Coatings: Pre-galvanized or hot-dip galvanized.
 - 3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.3 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: NFPA-approved, UL-listed, or FM-approved threaded-steel stud, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

- B. Mechanical-Expansion Anchors: NFPA-approved, UL-listed, or FM-approved, insert-wedge-type anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 1. Indoor Applications: Zinc-coated or Stainless steel.
 - 2. Outdoor Applications: Stainless steel.

2.4 EQUIPMENT SUPPORTS

- A. Description: NFPA-approved, UL-listed, or FM-approved, welded, shop- or field-fabricated equipment support, made from structural-carbon-steel shapes.

2.5 MATERIALS

- A. Aluminum: ASTM B 221.
- B. Carbon Steel: ASTM A 1011/A 1011M.
- C. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- D. Stainless Steel: ASTM A 240/A 240M.
- E. Grout: ASTM C 1107/C 1107M, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink, and nonmetallic grout, suitable for interior and exterior applications.
 - 1. Properties: Non-staining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with installation requirements of approvals and listings. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Install in accordance with approvals and listings.
 - 2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions. Install in accordance with approvals and listings.
- C. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- D. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- E. Install lateral bracing with pipe hangers and supports to prevent swaying.
- F. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- G. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- H. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for equipment supports.

- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

- A. Touchup: Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A 780/A 780M.

3.7 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with NFPA requirements for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.
- D. Use carbon-steel pipe hangers, supports and attachments for general service applications.

- E. Horizontal-Piping Hangers and Supports: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated stationary pipes for sizes NPS 1/2 to NPS 30.
 2. Steel Pipe Clamps (MSS Type 4): For suspension of non-insulated stationary pipes for sizes NPS 1/2 to NPS 24.
 3. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of non-insulated, stationary pipes for sizes NPS 1/2 to NPS 8.
 4. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of non-insulated, stationary pipes for sizes NPS 3/8 to NPS 3.
 5. U-Bolts (MSS Type 24): For support of heavy pipes for sizes NPS 1/2 to NPS 30.
 6. Pipe Saddle Supports (MSS Type 36): For support of pipes for sizes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 7. Pipe Stanchion Saddles (MSS Type 37): For support of pipes for sizes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 8. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes for sizes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
- F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers for sizes NPS 3/4 to NPS 24.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers for sizes NPS 3/4 to NPS 24, if longer ends are required for riser clamps.
- G. Hanger-Rod Attachments: Comply with NFPA requirements.
- H. Building Attachments: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable-Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. C-Clamps (MSS Type 23): For structural shapes.
 3. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
- I. Comply with NFPA requirements for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- J. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- K. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION

SECTION 21 0553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

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. Equipment labels.
- 2. Warning signs and labels.
- 3. Pipe labels.
- 4. Valve tags.
- 5. Warning tags.

- B. Related Sections:

- 1. Section 210517 “Sleeves and Sleeve Seals for Fire-Suppression Piping”
- 2. Section 210518 “Escutcheons for Fire-Suppression Piping”
- 3. Section 210523 “General Duty Valves for Fire Protection Piping”
- 4. Section 210529 “Hangers and Supports for Fire Suppression Piping and Equipment”
- 5. Section 211313 “Wet-Pipe Sprinkler Systems”

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.
- C. Valve Schedules: Valve numbering scheme.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
1. Material and Thickness: Stainless steel, 0.025-inch-thick, with predrilled holes for attachment hardware.
 2. Letter Color: Black.
 3. Background Color: Stainless Steel
 4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 6. Fasteners: Stainless-steel rivets or self-tapping screws.
 7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.
- C. Equipment-Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16-inch-thick, with predrilled holes for attachment hardware.
- B. Letter Color: Black.
- C. Background Color: Yellow.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction.
- B. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- C. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; pipe size; and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.
- D. Pipe-Label Colors:
 - 1. Background Color: Red.
 - 2. Letter Color: White.

2.4 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping-system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch-thick, with predrilled holes for attachment hardware.
 - 2. Fasteners: Brass wire-link chain or S-hook.
 - 3. Valve-Tag Color: Red.
 - 4. Letter Color: White.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

2.5 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.
2. Fasteners: Brass grommet and wire-link chain.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surface of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be installed.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of fire protection equipment.
- B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

- A. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 1. Near each valve and control device.
 2. Near each branch connection excluding short takeoffs. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

- B. Training Systems Pipe Labels: All fire suppression training systems shall be identified with labels that state “For Training Only” Each pipe label shall include this language along all piping serving a training system.

3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems. List tagged valves in a valve-tag schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and with captions like those indicated in "Valve-Tag Size and Shape" Subparagraph below:
 - 1. Valve-Tag Size and Shape:
 - a. Wet-Pipe Sprinkler System: 1-1/2 inches, round.
 - b. Dry-Standpipe Training System: 1-1/2 inches, round.

3.6 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

SECTION 21 1313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Steel Pipe and Fittings
2. Pipe Joining Materials
3. Specialty Valve
4. Sprinkler Specialty Pipe Fittings
5. Sprinklers.
6. Alarm devices.
7. Pressure gauges.

- B. Related Sections:

1. Section 210517 “Sleeves and Sleeve Seals for Fire-Suppression Piping”
2. Section 210518 “Escutcheons for Fire-Suppression Piping”
3. Section 210523 “General Duty Valves for Fire Protection Piping”
4. Section 210529 “Hangers and Supports for Fire Suppression Piping and Equipment”
5. Section 210553 “Identification for Fire-Suppression Piping and Equipment”

1.3 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

1.4 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.5 PERFORMANCE REQUIREMENTS

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

- B. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer licensed in the State of Georgia, using performance requirements and design criteria obtained.
- C. Sprinkler system design shall be approved by authorities having jurisdiction.
 - 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
 - 2. Sprinkler Occupancy Hazard Classifications:
 - a. Building Service Areas: Ordinary Hazard, Group 1.
 - b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
 - c. General Storage Areas: Ordinary Hazard, Group 1.
 - d. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
 - e. Office and Public Areas: Light Hazard.
 - f. Special Occupancy Hazard: As determined by NFPA 13 and authorities having jurisdiction.
 - 3. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
 - c. Special Occupancy Hazard: As determined by NFPA 13 and authorities having jurisdiction.
 - 4. Maximum Protection Area per Sprinkler: Per UL listing.
 - 5. Maximum Protection Area per Sprinkler:
 - a. Light Hazard: 225 sq. ft.
 - b. Ordinary Hazard: 130 sq. ft.
 - c. 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 for 30 minutes.
 - b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.

- C. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in the State of Georgia responsible for their preparation.
- D. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Structural steel
 - 2. Domestic water piping.
 - 3. HVAC duct.
 - 4. Items penetrating finished ceiling include the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Smoke Detectors
 - d. Exit Signs
- E. Qualification Data: For qualified Installer and professional engineer.
- F. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations.
 - 1. Sprinklers shall be referred to on drawings, submittals, and other documentation, by the sprinkler identification or Model number as specifically published in the appropriate agency listing or approval.
- G. Welding certificates.
- H. Grooved joint couplings and fittings shall be referred to on drawings and product submittals and be identified by the manufacturer's listed model or series designation.
- I. Fire hydrant flow test must be performed within 12 months of permit plan submission. Perform fire-hydrant flow test report, record and submit the following information:
 - 1. Date
 - 2. Time
 - 3. Performed by
 - 4. Location of Residual Fire Hydrant R
 - 5. Location of Flow Fire Hydrant F
 - 6. Static Pressure at Residual Fire Hydrant R (psig)
 - 7. Measured Flow at Flow Fire Hydrant F (gpm)
 - 8. Residual Pressure at Residual Fire Hydrant R (psig)
- J. 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."
- K. Field quality-control reports.
- L. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer licensed in the State of Georgia.

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

C. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

1. All castings used for couplings housings, fittings, or valve and specialty bodies shall be date stamped for quality assurance and traceability.

D. 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.

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

1. NFPA 13, "Installation of Sprinkler Systems."

1.8 COORDINATION

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

1.9 EXTRA MATERIALS

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

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

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

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

2.2 STEEL PIPE AND FITTINGS

- A. Standard Weight Galvanized- and Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.
- B. Schedule 10, Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10 plain end.
- C. Galvanized- and Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- D. Galvanized and Uncoated, Steel Couplings: ASTM A 865, threaded.
- E. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- F. Malleable- or Ductile-Iron Unions: UL 860.
- G. Cast-Iron Flanges: ASME 16.1, Class 125.
- H. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
- I. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
- J. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. National Fittings, Inc.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - 2. Pressure Rating: 175 psig minimum.
 - 3. Galvanized and Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 536, ductile-iron casting; with dimensions matching steel pipe. Where short-pattern fittings are used in applicable sizes, they should have equal flow to standard pattern fittings.
 - 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 center-leg gasket with pipe stop for proper groove engagement, alignment and pipe insertion depth, and ASTM A449 compliant bolts and nuts.
 - a. Flexible Type: For use in locations where vibration attenuation and stress relief are required.

2.3 PIPING JOINING MATERIALS

- A. 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.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- D. Grooved Joint Lubricants: Lubricate gasket in accordance with the manufacturer's published instructions with lubricant approved for the gasket elastomer and fluid media.

2.4 SPECIALTY VALVES

- A. General Requirements:
 - 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 2. Pressure Rating:
 - a. Standard-Pressure Piping Specialty Valves: 175 psig minimum.
 - 3. Body Material: Cast or ductile iron.
 - 4. Size: Same as connected piping.
 - 5. End Connections: Flanged or grooved.
- B. Alarm Check 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.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - e. Viking Corporation.
 - 2. Description: Ductile iron body with rubber-faced clapper hinged to access cover. All moving parts capable of being serviced without removing valve from installed position. External bypass trim with non-interruptible pressure switch to activate remote alarm. Include taps for inlet and outlet pressure gauges, alarm devices and system main drain. Include all trim and alarm test valve.
 - 3. Standard: UL 312 and FM Global's "Approval Guide"
- C. Floor Control | Zone Assembly:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Globe Fire Sprinkler Corporation.
 - b. Victaulic Company.
2. Description: Universal Manifold Check Valve: Where universal manifold check valves are specified for use in wet-pipe sprinkler systems, as floor control manifolds they shall be specifically listed for such use. Universal manifold check valves shall be ductile iron construction, incorporating a control valve, check valve, flow switch, test & drain assembly, adjustable relief valve, and system gauges in one compact body/footprint, and shall be manufactured for “right” and “left”-hand orientations. The test & drain assemble shall contain an adjustable relief valve, with a range of 175 to 310 psi, and a universal test orifice of K2.8; to provide testing capabilities of systems with k-factors ranging from K2.8 and larger. Universal manifold check valve shall be rated for use at the maximum service pressure of 300 psi and shall be UL listed and FM approved.
3. Standard: UL and FM Global’s “Approval Guide”

D. 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. Pressure Rating: 175 psig minimum.
4. Type: Automatic draining, ball check.
5. Size: NPS 3/4.
6. End Connections: Threaded.

E. Air Venting Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AGF Manufacturing Inc. (Basis of Design Model 7910MAV)
 - b. Globe Fire Sprinkler Corporation.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - e. Viking Corporation.
2. Standard: UL's "Product iQ". NFPA 13.
3. Pressure Rating: 300 psig minimum.
4. Body Material: Forge brass
5. Inlet/Outlet Size: 1/2-inch NPT.
6. End Connections: Threaded.

2.5 SPRINKLER SPECIALTY PIPE FITTINGS

A. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. National Fittings, Inc.
 - c. Shurjoint Piping Products.
 - d. Tyco Fire & Building Products LP.
 - e. Victaulic Company.
2. Standard: UL 213.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-T and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. 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; a division of Anvil International, Inc.
2. Standard: UL 1474.
3. Pressure Rating: 250 psig minimum.
4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

2.6 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.
3. Tyco Fire & Building Products LP.
4. Victaulic Company.
5. Viking Corporation.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.
 3. Sprinklers shall be glass bulb type, with hex shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation.
 - a. Wrenches shall be provided by the sprinkler manufacturer that directly engage the hex-shaped wrench boss integrally cast in the sprinkler body.
- C. Automatic Sprinklers with Heat-Responsive Element:
1. Nonresidential Applications: UL 199.
 2. UL listed and FM approved rigid coupling to join sprinklers with IGS profile grooved ends to matching 1" IGS outlets; Coupling shall consist of two cast copper-alloy housing segments for connection of ½", ¾", and 1" sprinklers. Coupling shall include an EPDM Type A gasket, with zinc-plated cap screws conforming to ASTM F835, and nylon insert locknut. Rated for a working pressure to 175 psi.
 3. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating and as follows for specific situations (unless otherwise indicated or required by application):
- D. Sprinkler Finishes:
1. Bronze.
 2. Painted.
- E. Corrosion resistant coatings to be one of the following unless indicated otherwise on plans:
1. Electroless Nickel PTFE Plated
 2. Nickel/Teflon coating
- F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
1. Ceiling or Sidewall Mounting: Plastic, white finish, one piece, flat to match sprinkler finish.
 2. Outdoor or in areas exposed to moisture: Non-corrosive to match sprinkler head finish.
- G. Sprinkler Guards:
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.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - e. Viking Corporation.
 2. Standard: UL 199.

3. Type: Wire cage with fastening device for attaching to sprinkler.

H. Flexible Sprinkler Drop Connections

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Reliable Automatic Sprinkler Co., Inc.
 - b. Tyco Fire & Building Products LP.
 - c. Victaulic Company.
 - d. Viking Corporation.
2. Material: Braided type 304 stainless steel flexible tube, zinc plated steel male threaded nipple or coupling for connection to branch-line piping, and a zinc plated steel reducer with a female thread for connection to the sprinkler head.
3. Bend: Flexible tube shall have a UL approved minimum bend radius of 3 inches. The number of bends when installed shall not exceed allowable bends per manufacturer.
4. Union joints shall be provided for ease of installation.
5. The flexible drop shall attach to the ceiling grid using manufacturer approved bracket.
6. The bracket shall allow installation before the ceiling tile is in place.
7. The braided drop system shall be UL listed and FM Approved for sprinkler services to 175 psi.
8. Maximum length of flexible drop shall be 6 feet.
9. Flexible drop connection to branch shall only be permitted to be on the top half of the branch pipe.
10. Flexible sprinkler drops are only permitted with suspended ACT type ceiling and ceiling grid.

2.7 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.
- B. 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 company.
 - b. Notifier; a Honeywell company.
 - c. Potter Electric Signal Company.
 - d. System Sensor
 2. Standard: UL 464.
 3. Type: Vibrating, metal alarm bell.
 4. Size: 6-inch minimum diameter.
 5. Finish: Red-enamel factory finish, suitable for outdoor use.
 6. Voltage: 24V
- C. Water-Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ADT Security Services, Inc.
 - b. McDonnell & Miller; ITT Industries.
 - c. Potter Electric Signal Company.
 - d. System Sensor; a Honeywell company.
 - e. Viking Corporation.
 - f. Watts Industries (Canada) Inc.
2. Standard: UL 346.
3. Water-Flow Detector: Electrically supervised.
4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig.
7. Design Installation: Horizontal or vertical.

D. Pressure Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFAC Inc.
 - b. Potter Electric Signal Company.
 - c. System Sensor; a Honeywell company.
 - d. Tyco Fire & Building Products LP.
 - e. Viking Corporation.
2. Standard: UL 346.
3. Type: Electrically supervised water-flow switch with retard feature.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design Operation: Rising pressure signals water flow.

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

2.8 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. Minimum Requirements:
 - 1. Standard: UL 393.
 - 2. Dial Size: 3-1/2- to 4-1/2-inch diameter.
 - 3. Pressure Gauge Range: 0 to 250 psig minimum.
 - 4. Water System Piping Gauge: Include "WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 WATER-SUPPLY CONNECTIONS

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

3.3 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
- C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 and smaller.

- E. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- F. Install Inspector's Test Valve and drain directly after flow switch in sprinkler system riser piping. Connect inspectors test drain piping into system drain piping. Test valve to be located and installed according to NFPA 13.
- G. Install sprinkler piping with drains for complete system drainage.
- H. Install automatic (ball drip) drain valve in piping between fire-department connection and check valve. Install automatic drip at lowest point of piping practical to drain water from piping. Install drain piping from automatic ball drip to spill over nearest floor drain or to outside building. Piping out of building to be corrosion resistant with insect screen.
- I. Install alarm devices in piping systems.
- J. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- K. Install pressure gauges on riser or feed main, at each sprinkler test connection. Include pressure gauges with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal and install where they will not be subject to freezing.
- L. Fill sprinkler system piping with water.
- M. 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."
- N. 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."
- O. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.4 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. 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 in accordance with the manufacturer's latest published instructions. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service. Gaskets shall be molded and produced by the grooved coupling manufacturer. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Grooved coupling manufacturer's factory trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove, and installation of grooved piping products. Factory trained representative shall periodically visit the jobsite to ensure best practices in grooved product installation are being followed. Contractor shall remove and replace any improperly installed products.
- I. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts in accordance with the manufacturer's latest published instructions. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service. Gaskets shall be molded and produced by the grooved coupling manufacturer. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Grooved coupling manufacturer's factory trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove, and installation of grooved piping products. Factory trained representative shall periodically visit the jobsite to ensure best practices in grooved product installation are being followed. Contractor shall remove and replace any improperly installed products.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger, support products, and installation in Section 210529 "Hangers and Supports for Fire Suppression Piping and Equipment."
 - 1. Vertical Piping: MSS Type 8 or 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.

- c. Longer than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
- 3. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Support vertical piping and tubing at base and at each floor.
- C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- D. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4 and smaller: 84 inches with 3/8-inch rod.
 - 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 - 3. NPS 2: 10 feet with 3/8-inch rod.
 - 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
 - 5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
 - 6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
- E. Install supports for vertical steel piping every 15 feet.

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. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
 - 2. Alarm Check Valves: Include trim and drain-line connection with bypass check valve and retarding chamber.

3.7 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.
- B. Install return bends in piping for all pendent type sprinkler heads.
- C. Install sprinkler guards on sprinklers that are installed at or below 78 inches, or as indicated on plans.

- D. Dry-barrel type sprinkler heads shall be field measured to confirm final barrel length prior to ordering.
- E. Do not install sprinklers that have been dropped, damaged, show a visible loss of fluid, or a cracked bulb.
- F. The sprinkler bulb protector shall be removable by hand, without tools or devices that may damage the bulb.

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 tests and inspections.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Coordinate with fire-alarm tests. Operate as required.
 - 6. Verify that equipment hose threads are same as local fire-department equipment.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.10 CLEANING

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

3.11 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain specialty valves and pressure-maintenance pumps.

3.12 PIPING SCHEDULE

- A. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, shall be one of the following:
 - 1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 - 2. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
- D. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 4, shall be one of the following:
 - 1. Standard-weight, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - 2. Standard-weight, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
- E. Standard-pressure, wet-pipe sprinkler system, NPS 5 and larger, shall be one of the following:
 - 1. Standard-weight, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - 2. Standard-weight, 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. Schedule 10, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
- F. Drain Piping NPS 2 and smaller, shall be the following:
 - 1. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

3.13 SPRINKLER SCHEDULE

- A. Provide quick response sprinkler heads for light and ordinary hazard areas and standard response sprinkler heads for extra hazard areas, unless prohibited by NFPA 13 or otherwise indicated.
- B. Use sprinkler types with finishes indicated in subparagraphs below for the following applications unless indicated otherwise on plans:
 - 1. Spaces with Ceilings: Semi-Recessed pendant sprinkler, white polyester finish with white escutcheon.
 - 2. Wall Mounting: Semi-Recessed sidewall sprinkler, white polyester finish with white escutcheon.

3. Below Overhead Doors: Sidewall sprinkler, rough bronze finish.
 4. Finished Spaces without Ceilings: Upright sprinklers with white or chrome plated finish.
 5. Unfinished Spaces without Ceilings: Upright sprinklers with rough bronze finish.
 6. IT Room: Dry barrel horizontal sidewall sprinkler, white polyester finish with white escutcheon.
 7. Special Applications: Extended-coverage, flow-control and ESFR sprinklers where indicated with finish to match other heads in space or in accordance with finishes above.
 8. Corrosive Environments: Corrosion resistant finish shall be factory applied to all heads exposed to acids, chemical, moisture or other corrosive fumes.
- C. Sprinklers for light and ordinary hazard classification areas shall be ordinary temperature heads with a red glass bulb and a minimum temperature rating of 155°F, unless indicated otherwise on drawings.

END OF SECTION

SECTION 211316 - DRY-PIPE SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Pipes, fittings, and specialties.
 - 2. Fire-protection valves.
 - 3. Sprinkler specialty pipe fittings.
 - 4. Sprinklers.
 - 5. Alarm devices.
 - 6. Manual control stations.
 - 7. Control panels.
 - 8. Pressure gages.
- B. Related Sections:
 - 1. Section 211313 "Wet-Pipe Sprinkler Systems" for wet-pipe sprinkler piping.

1.03 DEFINITIONS

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

1.04 SYSTEM DESCRIPTIONS

- A. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air or nitrogen. Opening of sprinklers releases compressed air or nitrogen and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from sprinklers that are open.

1.05 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- B. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer licensed in the State of Georgia, using performance requirements and design criteria indicated.
- C. Sprinkler system design shall be approved by authorities having jurisdiction.
 - 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
 - 2. Sprinkler Occupancy Hazard Classifications:

- a. Unoccupied Attics: Ordinary Hazard, Group 1.
 - b. Office and Public Areas: Light Hazard.
 - c. Special Occupancy Hazard: As determined by NFPA 13, FM Global, and authorities having jurisdiction.
3. Minimum Density for Automatic-Sprinkler Piping Design:
- a. Light-Hazard Occupancy, dry pipe system, with ceiling height up to 30':
 - a) 0.10 gpm over 1500-sq. ft. area.
 - b. Ordinary-Hazard, Group 1 Occupancy, dry pipe system, with ceiling height up to 30':
 - a) 0.20 gpm over 2500-sq. ft. area.
 - c. Special Occupancy Hazard: As determined by NFPA 13, and authorities having jurisdiction.
4. Maximum Protection Area per Sprinkler: Per UL listing.
5. Maximum Protection Area per Sprinkler:
- a. Office Spaces: 225 sq. ft..
 - b. Mechanical Equipment Rooms: 130 sq. ft.
 - c. Electrical Equipment Rooms: 130 sq. ft.
 - d. Combustible Attic Spaces: 130 sq.ft
 - 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. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.
- D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and **ASCE/SEI 7**.

1.06 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For dry-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in the State of Georgia responsible for their preparation.

1.07 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.
- 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.
- D. Fire hydrant flow test must be performed within 12 months of permit plan submission. Perform fire-hydrant flow test report, record and submit the following information:
- 1. Date
 - 2. Time
 - 3. Performed by
 - 4. Location of Residual Fire Hydrant R
 - 5. Location of Flow Fire Hydrant F
 - 6. Static Pressure at Residual Fire Hydrant R (psig)
 - 7. Measured Flow at Flow Fire Hydrant F (gpm)
 - 8. Residual Pressure at Residual Fire Hydrant R (psig)
- 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.

1.08 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.09 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.

1.10 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 licensed in the State of Georgia.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems."
- D. FM Global Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. FM Global Data Sheet 3-26, "Fire Protection for Nonstorage Occupancies."

1.11 PROJECT CONDITIONS

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

1.12 COORDINATION

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

PART 2 PRODUCTS

2.01 PIPING MATERIALS

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

2.02 STEEL PIPE AND FITTINGS

- A. Standard Weight, Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.
- B. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- C. Galvanized, Steel Couplings: ASTM A 865, threaded.
- D. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- E. Malleable- or Ductile-Iron Unions: UL 860.
- F. Cast-Iron Flanges: ASME B16.1, Class 125.
- G. Grooved-Joint, Steel-Pipe Appurtenances:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. Corcoran Piping System Co.
 - c. National Fittings, Inc.
 - d. Shurjoint Piping Products.
 - e. Tyco Fire & Building Products LP.
 - f. Victaulic Company.
2. Pressure Rating: 175 psig minimum.
3. Galvanized, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.03 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick.
 1. Class 125, Cast-Iron and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
 2. Class 250, Cast-Iron and Class 300, Raised-Face Flanges: Ring-type gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2.04 LISTED FIRE-PROTECTION VALVES

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

- b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. Fire Protection Products, Inc.
 - d. Globe Fire Sprinkler Corporation.
 - e. Milwaukee Valve Company.
 - f. Mueller Co.; Water Products Division.
 - g. NIBCO INC.
 - h. Potter Roemer.
 - i. Reliable Automatic Sprinkler Co., Inc.
 - j. Tyco Fire & Building Products LP.
 - k. United Brass Works, Inc.
 - l. Victaulic Company.
 - m. Viking Corporation.
 - n. Watts Water Technologies, Inc.
2. Standard: UL 312
 3. Pressure Rating: 250 psig minimum.
 4. Type: Swing check.
 5. Body Material: Cast iron.
 6. End Connections: Flanged or grooved.
- D. Bronze OS&Y Gate Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. United Brass Works, Inc.
 2. Standard: UL 262.
 3. Pressure Rating: 175 psig.
 4. Body Material: Bronze.
 5. End Connections: Threaded.
- E. 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; Crane Valves.
 - b. Milwaukee Valve Company.
 - c. Mueller Co.; Water Products Division.
 - d. NIBCO INC.
 - e. Tyco Fire & Building Products LP.
 - f. United Brass Works, Inc.
 - g. Watts Water Technologies, Inc.
 2. Standard: UL 262.

3. Pressure Rating: 250 psig minimum.
4. Body Material: Cast or ductile iron.
5. End Connections: Flanged or grooved.

F. NRS 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. Mueller Co.; Water Products Division.
 - c. NIBCO INC.
 - d. Tyco Fire & Building Products LP.
2. Standard: UL 262.
3. Pressure Rating: 250 psig minimum.
4. Body Material: Cast iron with indicator post flange.
5. Stem: Non-rising.
6. End Connections: Flanged or grooved.

2.05 TRIM AND DRAIN VALVES

A. General Requirements:

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

B. Angle Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire Protection Products, Inc.
 - b. United Brass Works, Inc.

C. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. Fire-End & Croker Corporation.
 - c. Fire Protection Products, Inc.
 - d. Milwaukee Valve Company.
 - e. NIBCO INC.
 - f. Potter Roemer.
 - g. Tyco Fire & Building Products LP.
 - h. Victaulic Company.
 - i. Watts Water Technologies, Inc.

2. Port Size: Full
- D. Globe Valves:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire Protection Products, Inc.
 - b. United Brass Works, Inc.
- E. Plug Valves:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Southern Manufacturing Group.

2.06 SPECIALTY VALVES

- A. General Requirements:
 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 2. Pressure Rating:
 - a. Standard-Pressure Piping Specialty Valves: 175 psig minimum.
 - b. High-Pressure Piping Specialty Valves: 250 psig minimum.
 3. Body Material: Cast or ductile iron.
 4. Size: Same as connected piping.
 5. End Connections: Flanged or grooved.
- B. Dry-Pipe Valves:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Globe Fire Sprinkler Corporation.
 - b. Reliable Automatic Sprinkler Co., Inc.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - e. Viking Corporation.
 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) General Air Products, Inc.
 - 2) Globe Fire Sprinkler Corporation.
 - 3) Reliable Automatic Sprinkler Co., Inc.

- 4) Tyco Fire & Building Products LP.
- 5) Victaulic Company.
- 6) Viking Corporation.
- 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 adjustable range, and 175-psig outlet pressure.
6. 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.
 - b. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - c. Motor Horsepower: Fractional.
 - d. Power: 120-V ac, 60 Hz, single phase.
 - e. Mounting: Riser Mounted
- C. Deluge Valves:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFAC Inc.
 - b. BERMAD Control Valves.
 - c. CLA-VAL Automatic Control Valves.
 - d. Globe Fire Sprinkler Corporation.
 - e. OCV Control Valves.
 - f. Reliable Automatic Sprinkler Co., Inc.
 - g. Tyco Fire & Building Products LP.
 - h. Venus Fire Protection Ltd.
 - i. Victaulic Company.
 - j. Viking Corporation.
 2. Standard: UL 260.
 3. Design: Hydraulically operated, differential-pressure type.
 4. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, drip cup assembly piped without valves and separate from main drain line, fill-line attachment with strainer, and push-rod chamber supply connection.
 5. Dry, Pilot-Line Trim Set: Include dry, pneumatic 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. Pneumatic actuator must receive a signal from fire detection system and

a loss of air pressure on dry, pilot line side to allow actuator to open and water to flow into valve.

6. Air-Pressure Maintenance Device:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) AFAC Inc.
 - 2) Globe Fire Sprinkler Corporation.
 - 3) Reliable Automatic Sprinkler Co., Inc.
 - 4) Tyco Fire & Building Products LP.
 - 5) Venus Fire Protection Ltd.
 - 6) Victaulic Company.
 - 7) Viking Corporation.
 - 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 adjustable range, and 175-psig 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.
 - b. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - c. Motor Horsepower: Fractional.
 - d. Power: 120-V ac, 60 Hz, single phase.

D. 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. Pressure Rating: 175 psig minimum.
4. Type: Automatic draining, ball check.
5. Size: NPS 3/4.
6. End Connections: Threaded.

2.07 SPRINKLER SPECIALTY PIPE FITTINGS

- A. General Requirements for Dry-Pipe-System Fittings: UL listed for dry-pipe service.

B. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. National Fittings, Inc.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
2. Standard: UL 213.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-T and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

C. Flow Detection and Test Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AGF Manufacturing Inc.
 - b. Globe Fire Sprinkler Corporation.
 - c. Reliable Automatic Sprinkler Co., Inc.
 - d. Tyco Fire & Building Products LP.
 - e. Victaulic Company.
2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

D. Sprinkler Inspector's Test Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AGF Manufacturing Inc.
 - b. Globe Fire Sprinkler Corporation.
 - c. Triple R Specialty.
 - d. Tyco Fire & Building Products LP.
 - e. Victaulic Company.
 - f. Viking Corporation.
2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.

3. Pressure Rating: 175 psig minimum.
 4. Body Material: Cast- or ductile-iron housing with integral sight glass.
 5. Valve Type: Multi-position valve with positions for closed, test and drain.
 - a. "Test Position shall be equivalent to a ½" sprinkler orifice discharge.
 6. Size: 1 inch inlet and outlet.
 7. Inlet and Outlet: Threaded.
- E. 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; a division of Anvil International, Inc.
 2. Standard: UL 1474.
 3. Pressure Rating: 250 psig minimum.
 4. Body Material: Steel pipe with EPDM O-ring seals.
 5. Size: Same as connected piping.
 6. Length: Adjustable.
 7. Inlet and Outlet: Threaded.

2.08 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.
 3. Tyco Fire & Building Products LP.
 4. Victaulic Company.
 5. Viking Corporation.
- B. General Requirements:
1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.
- C. Automatic Sprinklers with Heat-Responsive Element:
1. Nonresidential Applications: UL 199.
 2. Characteristics: Nominal 1/2-inch orifice with discharge coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
- D. Sprinkler Finishes:
1. Chrome plated.
 2. Bronze.

3. Painted.
- E. Special Coatings to be one of the following unless indicated otherwise on plans:
 1. Electroless Nickel PTFE Plated
 2. Nickel/Teflon coating
- F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
 1. Ceiling or Sidewall Mounting: Plastic, white finish, one piece, flat to match sprinkler finish.
 2. Outdoor or in areas exposed to moisture: Non-corrosive to match sprinkler head finish.
- G. Sprinkler Guards:
 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.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - e. Viking Corporation.
 2. Standard: UL 199.
 3. Type: Wire cage with fastening device for attaching to sprinkler.

2.09 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.
- B. Electrically Operated Alarm Bell:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire-Lite Alarms; a Honeywell company.
 - b. Notifier; a Honeywell company.
 - c. Potter Electric Signal Company.
 2. Standard: UL 464.
 3. Type: Vibrating, metal alarm bell.
 4. Size: 8-inch minimum diameter.
 5. Finish: Red-enamel factory finish, suitable for outdoor use.
- C. Pressure Switches:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Potter Electric Signal Company.
 - b. System Sensor; a Honeywell company.
 - c. Tyco Fire & Building Products LP.

- d. Viking Corporation.
 2. Standard: UL 346.
 3. Type: Electrically supervised water-flow switch with retard feature.
 4. Components: Single-pole, double-throw switch with normally closed contacts.
 5. Design Operation: Rising pressure signals water flow.
- D. Valve Supervisory Switches:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire-Lite Alarms; a Honeywell company.
 - b. Kennedy Valve; a division of McWane, Inc.
 - c. Potter Electric Signal Company.
 - d. System Sensor; a Honeywell company.
 2. Standard: UL 346.
 3. Type: Electrically supervised.
 4. Components: Single-pole, double-throw switch with normally closed contacts.
 5. Design: Signals that controlled valve is in other than fully open position.

2.10 MANUAL CONTROL STATIONS

- A. Standard: UL listed or FM Global approved.
- B. Hydraulic operation, with union, NPS 1/2 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.
- C. Electric operation, metal enclosure, labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

2.11 CONTROL PANELS

- A. Description: Single-area, two-area, or single-area cross-zoned type control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves. Panels contain power supply; battery charger; standby batteries; field-wiring terminal strip; electrically supervised solenoid valves and polarized fire-alarm bell; lamp test facility; single-pole, double-throw auxiliary alarm contacts; and rectifier.
 1. Panels: UL listed and FM Global approved when used with thermal detectors and Class A detector circuit wiring. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.

2.12 PRESSURE GAGES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. AMETEK, Inc.; U.S. Gauge Division.
 2. Ashcroft, Inc.
 3. Brecco Corporation.

4. WIKA Instrument Corporation.
- B. Minimum Requirements:
1. Standard: UL 393.
 2. Dial Size: 3-1/2- to 4-1/2-inch diameter.
 3. Pressure Gage Range: 0 to 250 psig minimum.
 4. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
 5. Air System Piping Gage: Include retard feature and "AIR" or "AIR/WATER" label on dial face.

PART 3 EXECUTION

3.01 PREPARATION

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

3.02 WATER-SUPPLY CONNECTIONS

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

3.03 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- B. Piping Standard: Comply with requirements in NFPA 13 for installation of sprinkler piping.
- C. Install seismic restraints on piping. Comply with requirements in NFPA 13 for seismic-restraint device materials and installation.
- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- G. Install Inspectors Test Valve and drain directly after flow switch in sprinkler system piping near riser. Connect inspectors test drain piping into system drain piping. Test valve to be located and installed according to NFPA 13.
- H. Install sprinkler piping with drains for complete system drainage.

- I. Install automatic (ball drip) drain valve in piping between fire-department connection and check valve. Install automatic drip at lowest point of piping practical to drain water from piping. Install drain piping from automatic ball drip to spill over nearest floor drain or to outside building. Piping out of building to be corrosion resistant with insect screen.
- J. Connect compressed-air supply to dry-pipe sprinkler piping.
- K. 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.
- L. Install alarm devices in piping systems.
- M. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements in NFPA 13 for hanger materials.
- N. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- O. Drain dry-pipe sprinkler piping.
- P. Pressurize and check dry-pipe sprinkler system piping, air-pressure maintenance devices and air compressors.
- Q. 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."
- R. 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."
- S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.04 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. 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.
- I. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.05 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
 - 1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
 - 2. Dry-Pipe and Deluge Valves: Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - a. Install air compressor and compressed-air supply piping.
 - b. Air-Pressure Maintenance Device: Install shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with 14- to 60-psig adjustable range; and 175-psig maximum inlet pressure.

3.06 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.
- B. Install return bends in piping for all pendent type sprinkler heads.

- C. Install sprinkler guards on sprinklers that are installed at or below 78 inches, or as indicated on plans.
- D. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
- E. Dry-barrel type sprinkler heads shall be field measured to confirm final barrel length prior to ordering.

3.07 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."

3.08 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Start and run air compressors.
 - 6. Coordinate with fire-alarm tests. Operate as required.
 - 7. Coordinate with fire-pump tests. Operate as required.
 - 8. Verify that equipment hose threads are same as local fire-department equipment.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.09 CLEANING

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

3.10 DEMONSTRATION

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

3.11 PIPING SCHEDULE

- A. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Standard-pressure, dry-pipe sprinkler system, NPS 2½” and smaller, shall be the following:
 - 1. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
- D. Standard-pressure, dry-pipe sprinkler system, NPS 3 to NPS 6, shall be the following:
 - 1. Standard-weight, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.12 SPRINKLER SCHEDULE

- A. All sprinklers shall be quick response type unless prohibited by NFPA 13.
- B. Use sprinkler types with finishes indicated in subparagraphs below for the following applications unless indicated otherwise on plans:
 - 1. Spaces with Ceilings: Dry-barrel type Semi-Recessed pendant sprinkler, white polyester finish with white escutcheon.
 - 2. Wall Mounting: Dry-barrel type semi-recessed sidewall sprinkler, white polyester finish with white escutcheon.
 - 3. Finished Spaces without Ceilings: Upright sprinklers with white or chrome plated finish.
 - 4. Unfinished Spaces without Ceilings: Upright sprinklers with rough bronze finish.
 - 5. Special Applications: Extended-coverage, flow-control and ESFR sprinklers where indicated with finish to match other heads in space or in accordance with finishes above.
 - 6. Corrosive Environments: Corrosion resistant finish shall be factory applied to all heads exposed to acids, chemical, moisture or other corrosive fumes.

END OF SECTION 211316