

SECTION 210500 - COMMON WORK RESULTS FOR FIRE-SUPPRESSION (*AD-01)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors.
- C. Exposed, Exterior Installations: Exposed to view outdoors.
- D. Subject to Freezing: Subject to temperatures below 40 degrees F.
- E. Concealed, Interior Installations: Concealed from view and protected from physical contact by occupants.
- F. Concealed, Exterior Installations: Concealed from view and protected from physical contact by occupants.
- G. The following are industry abbreviations for plastic materials:
 - 1. CPVC: Chlorinated polyvinyl chloride plastic.
- H. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.3 QUALITY ASSURANCE

- A. Equipment and appliances comprising portions of the mechanical systems regulated by the International Mechanical Code shall be listed and labeled in accordance with the current edition of the Virginia International Building Code.
- B. Equipment and appliances comprising portions of the fire suppression systems regulated by the NFPA 13 shall be installed in accordance with the listing and the manufacturer's installation instructions. Manufacturer's installation instructions shall be available on the job site for use and inspection.

- C. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- D. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Fire-suppression piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- E. Electrical Characteristics for Fire-Suppression Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.5 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for fire-suppression items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

1.6 INTENT OF CONTRACT DOCUMENTS

- A. Fire Suppression/Protection drawings are diagrammatic, indicating general locations and arrangements of pipe, and equipment. Not necessarily indicating all offsets, conditions, and appurtenances required to provide clearances for maximum practical accessibility to perform maintenance.
- B. Coordinate work to achieve proper operation and to provide a maintainable installed condition.
- C. Notify the Architect's representative immediately of conditions which do not comply or will not produce this result.

PART 2 - PRODUCTS

2.1 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match fire-suppression piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180°F.
- D. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and non-corrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225°F.
- F. Dielectric Nipples: Electroplated steel nipple with inert and non-corrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225°F.]

2.2 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - 1. Available Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Plastic. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 JOINING MATERIALS

- A. Pipe Joint Compound for Threaded Pipe: UL listed.

2.4 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.5 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around fire-suppression piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw. Finish: Polished chrome-plated and rough brass.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw. Finish: Polished chrome-plated and rough brass.
- E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.
- F. Split-Plate, Stamped-Steel Type: With exposed-rivet hinge, set screw or spring clips, and chrome-plated finish.
- G. One-Piece, Floor-Plate Type: Cast-iron floor plate.
- H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.6 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 FIRE-SUPPRESSION PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install fire-suppression piping according to the following requirements and Division 21 Sections specifying fire-suppression piping systems.
- B. Install fire-suppression piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- C. Install fire-suppression piping indicated to be exposed and fire-suppression piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise. Diagonal runs are permitted in the attic spaces.
- D. Install fire-suppression piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install fire-suppression piping to permit valve servicing.
- F. Install fire-suppression piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1. Fire-suppression piping:
 - a. Fire-suppression piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Fire-suppression piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Fire-suppression piping: One-piece, stamped-steel type with spring clips.
 - d. Bare Fire-suppression piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Bare Fire-suppression piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - f. Bare Fire-suppression piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
 - g. Bare Fire-suppression piping in Equipment Rooms: One-piece, cast-brass type.
 - h. Bare Fire-suppression piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- J. Sleeves are not required for core-drilled holes.
- K. Permanent sleeves are not required for holes formed by removable PE sleeves.

- L. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
1. 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. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
 3. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- M. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- N. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- P. Verify final equipment locations for roughing-in.

- Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 FIRE-SUPPRESSION PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying fire-suppression piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. 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 pipe joint compound to external pipe threads unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Grooved Joints: Assemble joints with listed coupling, gasket, lubricant, and bolts.
1. Ductile-Iron Pipe: Radius-cut-groove ends of piping. Use grooved-end fittings and grooved-end-pipe couplings.
 2. Steel Pipe: Roll-groove piping. Use grooved-end fittings and rigid, grooved-end-pipe couplings, unless otherwise indicated.
- F. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- H. Plastic Fire-suppression piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 2. CPVC Fire-suppression piping: Join according to ASTM D 2846/D 2846M Appendix.
- I. Plastic Pressure Fire-suppression piping Gasketed Joints: Join according to ASTM D 3139.

3.3 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete."

3.4 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.
- B. Field Welding: Comply with AWS D1.1.

3.5 GROUTING

- A. Mix and install grout for fire suppression equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

3.6 EXCAVATION AND BACKFILL

- A. Excavation and backfill shall be as indicated in Division 1 specifications and on the drawings. If excavation and backfill is not otherwise indicated the following shall apply:
 1. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - a. Beyond the building perimeter, excavate trenches to allow installation of top of pipe below minimum depth of cover based on locality or 1'-0" below frost line whichever is lower.

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2. Excavate trenches to uniform widths to provide twelve inches clear on each side of pipe. Excavate trench walls vertically from trench bottom.
3. Trench Bottoms: Excavate trench bottoms to provide flat surface. Place and compact six inches of sand. Excavate and shape sand to provide uniform bearing and support of pipes. Shape sand to provide continuous support for bells, joints, fittings, and barrels of pipes. Sand shall be free of projecting stones and sharp objects.
4. Backfill and hand tamp to 95% proctor to six inches above the top of the pipe.
5. Backfill and machine tamp the remainder of the trench to 95% proctor in twelve-inch lifts.

END OF SECTION 210500

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SECTION 211000 - WATER-BASED FIRE-SUPPRESSION SYSTEMS(*AD-01)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY

- A. Description of Work:

1. The work includes redesigning and providing modifications to the existing automatic fire extinguishing system, including relocation of existing heads and additional heads to provide a final automatic fire extinguishing system of required hazard for building occupancy to afford complete fire protection coverage throughout. Where required the work shall include upsizing existing mains to increase flows for more hydraulically demanding hazard classifications. The design, equipment, materials, installation and workmanship shall be in strict accordance with the Owners insurance underwriters requirements, the Virginia Construction Code, and the required and advisory provisions of NFPA.
2. Unless otherwise indicated piping shall not be run in spaces containing electrical equipment in the form of transformers, panel-boards, switchgear, or computer servers.
 - a. Exceptions:
 - 1) Personal computers (PC,s)
 - 2) Spaces whose name does not include the term "Electrical", "Data", or "Computer"
3. Each system shall include materials, accessories and equipment necessary to provide each system complete and ready for use.
4. The design of each system shall give full consideration to blind spaces, piping, electrical equipment, ductwork, and all other construction and equipment to afford complete coverage.
5. Devices and equipment for fire protection service shall be of an approved make and type listed by the Underwriters' Laboratories, Inc., or approved by the Factory Mutual System.
6. In the publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears.
7. Reference to the "authority having jurisdiction" shall be interpreted to mean the Local Fire Marshal..

8. Calculations shall include delivering water from the point of the fire hydrant flow test through the site piping.
9. Consideration shall be given to all unheated areas such as attics, utility rooms, loading docks, outdoor storage spaces with canopies, etc., to provide freeze protection in accordance with NFPA 13. This shall include the installation of dry sprinklers, anti-freeze, and dry-pipe sprinkler systems where necessary.

1.3 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply. 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.

1.4 PERFORMANCE REQUIREMENTS

- A. Component Working Pressure: Listed for at least 175 psig.
- B. Design shall be approved by authorities having jurisdiction.
- C. Fire-suppression sprinkler system design shall include the following:
 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventer, 10 psi or in accordance with local fire marshal.
 2. Sprinkler Occupancy Hazard Classifications shall be as indicated on the drawings. If not indicated comply with NFPA 13.
 3. Maximum Protection Area per Sprinkler shall be in accordance with its UL listing.
- D. Seismic Performance: Fire-suppression piping shall be capable of withstanding the effects of earthquake motions determined according to ASCE 7-02, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
- E. Seismic Performance for category C thru F: Fire-suppression piping shall be capable of withstanding the effects of earthquake motions determined according to NFPA 13

1.5 SUBMITTALS

- A. Product Data: For the following:
 1. Piping materials, flexible connections, and sprinkler specialty fittings.
 2. Pipe hangers and supports.
 3. Valves, including listed fire-protection valves, unlisted general-duty valves, specialty valves and trim.
 4. Air compressors, including electrical data.

5. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
 6. Alarm devices, including electrical data.
- B. Fire-hydrant flow test report.
- C. Approved Sprinkler Piping Shop Drawings: Working plans, prepared according to NFPA 13, including hydraulic calculations. Diagram power, signal, and control wiring.
1. Include shop drawings indicating location of all sprinkler heads and all other construction that penetrates ceilings, including light fixtures, HVAC equipment, speakers, fire alarm devices, partition assemblies, etc.
- D. Welding certificates.
- E. Operation and Maintenance Data to include in emergency, operation, and maintenance manuals.
- 1.6 CLOSEOUT SUBMITTALS
- A. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13 and NFPA 14. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications:
1. Installer's responsibilities include designing, fabricating, and installing fire-suppression systems and providing professional engineering services needed to assume engineering responsibility. A Professional Engineer registered in the state where the project is constructed shall stamp and seal the Shop Drawings.
- B. Flow test:
1. Bid shall be based on the indicated fire-hydrant flow and pressure.
 2. Design calculations shall be based on the results of a confirming fire-hydrant flow test performed or caused to be performed by the contractor dated within 1 year of shop drawings submission date.
- C. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
- D. NFPA Standards: Fire-suppression-system equipment, specialties, accessories, installation, and testing shall comply with the following:
1. NFPA 13: "Installation of Sprinkler Systems." applicable edition.

1.8 COORDINATION

- A. Relocate piping to clear the path of ductwork.
- B. Relocate piping to clear the path of conduit.
- C. Relocate piping to clear the path of cable tray.
- D. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

1.9 SPRINKLER CABINET(S) AND SPARE SPRINKLERS

- A. Provide finished, wall-mounted, steel sprinkler cabinet with hinged cover.
- B. Provide space for minimum of six spare sprinklers and sprinkler wrench.
- C. Provide minimum of six spare sprinklers and sprinkler wrench in cabinet.
- D. Provide number of sprinklers required by NFPA 13.
- E. Provide separate cabinet with sprinklers and wrench for each type of sprinkler on Project.
- F. Provide products packaged with protective covering for storage. Identify contents with label.

PART 2 - PRODUCTS

2.1 STEEL PIPE AND FITTINGS

- A. Threaded-End, Schedule 40 Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, hot-dip galvanized where indicated and with factory- or shop-formed threaded or grooved ends.
 - 1. Cast-Iron Threaded Flanges: ASME B16.1.
 - 2. Malleable-Iron Threaded Fittings: ASME B16.3.
 - 3. Gray-Iron Threaded Fittings: ASME B16.4.
 - 4. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe. Include ends matching joining method.
 - 5. Steel Threaded Couplings: ASTM A 865.
- B. Plain-End, Schedule 40 Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795 hot-dip galvanized where indicated.
 - 1. Steel Welding Fittings: ASTM A 234/A 234M, and ASME B16.9 or ASME B16.11.
 - 2. Steel Flanges and Flanged Fittings: ASME B16.5.

C. Grooved-End, Schedule 40 Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, hot-dip galvanized where indicated and with factory- or field-formed, square-cut- or roll-grooved ends.

1. Grooved-Joint Piping Systems:

a. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company: FireLock.

b. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD. Basis of design shall be Victaulic Firelock fittings, models 001, 002, 003, 006 for sizes 2" thru 8". Smaller sizes shall be Victaulic models 10, 11, 20, 60 or IR fittings or IGS fittings. No Threaded fittings can be used 1-1/4" -12".

1. Installation-Ready™ fittings for grooved end steel piping in fire protection applications sizes NPS 1-¼ thru 2½ (DN 32 thru DN 65). Fittings shall consist of a ductile iron housing conforming to ASTM A-536, Grade 65-45-12, with Installation-Ready™ ends, [orange enamel coated] [red enamel coated] [galvanized]. Fittings complete with pre-lubricated Grade "E" EPDM Type 'A' gasket; and ASTM A449 electroplated steel bolts and nuts. System shall be UL listed for a working pressure of 300 psi (2065 kPa) and FM approved for working pressure 365 psi (2517kPa).

2. Fittings shall have a shorter center-to-end dimensions for installation in tight spaces.

3. Fittings are rigid, for direct stab installation without field disassembly.

4. Installation-Ready™ Fittings shall be Victaulic FireLock® Style 101, Style 102, and style 103, which shall be designed for direct "stab" installation onto grooved pipe without prior disassembly of the fitting.

5. Fittings shall require visual pad-to-pad verification of complete installation.

c. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, prelubricated rubber gasket listed for use with housing, and ASTM A449 compliant steel bolts and nuts. Coupling design shall be visual bolt pad to bolt pad, NO coupling requiring a torque wrench shall be used. Only IR Couplings will be used. For dry systems a Flush Seal gasket shall be used.

d. 1" In lieu of threaded steel piping systems, the Victaulic FireLock IGS System with "Installation-Ready™ fittings and couplings will be used for NPS 1 (DN 25) Schedule 10 and Schedule 40 carbon steel pipe in fire protection applications. System rated for a maximum working pressure to 365 psi (2517 kPa).

1. Groove: IGS "Innovative Groove System" groove with shortened "A" dimension and tapered groove backside for ease of installation.
 - a. Grooving Tool: Victaulic RG2100, with IGS Confirmation Gauge.
2. Fittings:
 - a. Ductile iron housing conforming to ASTM A-536, Grade 65-45-12. Orange enamel coated or galvanized.
 - i. Victaulic Style 101 (90-degree elbow), Style 102 (tee), and Style 108 (coupling) with Installation-Ready™ ends.
 - ii. Style 108 single-bolt coupling provided with EPDM Type A pressure responsive gasket with Vic-Plus lubricant, and ASTM A449 compliant electroplated steel bolt and nut. CrMo alloy steel coupling linkage.
 - b. Thread x Groove adapter fittings and welded outlets with IGS grooved end, ASTM A53, grade A.

1. Victaulic Mechanical Couplings for Fire Protection: Basis of Design. Manufactured in two segments of cast ductile iron, conforming to ASTM A-536, Grade 65-45-12. Gaskets shall be pressure-responsive synthetic rubber, grade to suit the intended service, conforming to ASTM D-2000. Mechanical Coupling bolts shall be zinc plated (ASTM B-633) heat treated carbon steel track head conforming to ASTM A-449 and A-183, minimum tensile strength 110,000 psi (758450 kPa) as provided standard Victaulic.

a. **Rigid Type:**

- 1) "Installation Ready" rigid joints shall be Victaulic FireLock® EZ Style 009N and 107N, in sizes 1-1/4"(DN32) through 12" (DN300) sizes as only approved manuf. Designed for direct "stab" installation onto grooved pipe without prior disassembly of the coupling. For sizes 1-1/4"(DN32) through 2" (DN50) sizes. One bolt Style 108 couplings will be used for 1" size. One bolt 109 couplings can be used in lieu of 009N.
- 2) Housings shall be cast with offsetting, angle-pattern bolt pads to provide system rigidity and support and hanging in accordance with NFPA 13.
- 3) Rigid couplings shall require visual pad-to-pad verification of complete installation. Tongue and recess type couplings which require the use of a torque wrench to achieve the exact required gap between housings are not permitted. Installation Ready (IR) couplings will be the only style coupling approved.

b. **Flexible Type:** Use in seismic areas where required by NFPA 13.

- 1) "Installation Ready" flexible joints shall be Victaulic Style 177N QuickVic™, in sizes 2"(DN50) through 8"(DN200), which shall be designed for direct "stab" installation onto grooved pipe without prior disassembly of the coupling.

- c. Standard flexible couplings shall be Victaulic Style 77.
- D. Grooved-End, Schedule 10 Steel Pipe: Schedule 10 in NPS 2½” and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10; with factory- or field-formed, roll-grooved ends.
1. Grooved-Joint Piping Systems:
- a. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company: FireLock.
 - b. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
 - c. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, pre-lubricated rubber gasket listed for use with housing, steel bolts and nuts.
 - d. In lieu of rigid pipe offsets or return bends for sprinkler drops, the Victaulic VicFlex™ Multiple-Use Flexible Stainless Steel Sprinkler Drop System may be used to locate sprinklers as required by final finished ceiling tiles and walls. The drop system shall consist of a braided type 304 stainless steel flexible tube, zinc plated steel Male threaded nipple or Victaulic FireLock IGS Groove Style 108 coupling for connection to branch-line piping, and a zinc plated steel reducer with a female thread for connection to the sprinkler head.
 - 1) The drop shall include a UL approved Series AH1 with 3” bend radius; AH2-CC braided hose with a bend radius to 2” to allow for proper installation in confined spaces.
 - 2) Union joints shall be provided for ease of installation.
 - 3) The flexible drop shall attach to the ceiling grid using a one-piece open gate Series AB2N bracket over/under. The bracket shall allow installation before the ceiling tile is in place.
 - a) Grooving Tool: Victaulic RG2100, with IGS Confirmation Gauge.

2.2 FLEXIBLE CONNECTORS

- A. Flexible connectors shall have materials suitable for system fluid. Include 175-psig minimum working-pressure rating and ends according to the following:
- 1. NPS 2 and Smaller: grooved.
 - 2. NPS 2-1/2 (DN 65) and Larger: grooved.
 - 3. Option for NPS 2-1/2 and Larger: Grooved for use with grooved-end-pipe couplings.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company AH2CC.
- C. Stainless-Steel-Hose/Stainless-Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to hose.

2.3 CORROSION-PROTECTIVE ENCASEMENT FOR PIPING

- A. Encasement for Underground Metal Piping: ASTM A 674 or AWWA C105, PE film, 0.008-inch minimum thickness, tube or sheet.

2.4 SPRINKLER SPECIALTY FITTINGS

- A. Sprinkler specialty fittings shall be UL listed or FMG approved, with 175-psig (1200-kPa) minimum working-pressure rating, and made of materials compatible with piping.
- B. Outlet Specialty Fittings:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company.
 2. Mechanical-T and -Cross Fittings: UL 213, ductile-iron housing with gaskets, bolts and nuts, and threaded, locking-lug, or grooved outlets. Basis of design Victaulic style 920/920N and style 922.
 3. Snap-On and Strapless Outlet Fittings: UL 213, ductile-iron housing or casting with gasket and threaded outlet. Basis of design Victaulic style 923.
- C. Sprinkler Drain and Alarm Test Fittings: Cast- or ductile-iron body; with threaded or locking-lug inlet and outlet, test valve, and orifice and sight glass.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company.

2.5 LISTED FIRE-PROTECTION VALVES

- A. Valves shall be UL listed or FMG approved, with 175-psig minimum pressure rating.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company.
- B. OS&Y Gate Valves: UL 262.
1. Ductile-iron body with flanged x Groove or groove x groove ends. No Flange x Flange will be accepted.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company or engineer approved equal. Basis of design Victaulic model 771H or 771F.
- C. Ball Valves: Comply with UL 1091, except with ball instead of disc.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company.

2. NPS 1-1/2 and Smaller: Bronze body with grooved ends. Basis of Design: Victaulic Series 728.
3. NPS 2 and NPS 2-1/2: ductile-iron body with grooved ends.
4. NPS 3: Ductile-iron body with grooved ends.

D. Butterfly Valves: UL 1091.

1. NPS 2 and Smaller: Bronze body with grooved ends.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company.
2. NPS 2-1/2 and Larger: Bronze, cast-iron, or ductile-iron body; wafer type or with flanged or grooved ends. Valve seat shall be pressure-responsive, and the stem offset from the disc centerline to provide complete 360-degree circumferential seating. Basis of Design: Victaulic Series 705. Each valve must be individually tested at factory to include electronics.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company.

E. Check Valves NPS 2 and Larger: UL 312, spring-assisted swing type for vertical or horizontal installation, cast- ductile iron body with flanged or grooved ends. Basis of Design: Victaulic Series 717.

F. Indicating Valves: UL 1091, with integral indicating device and ends matching connecting piping.

1. Indicator: Weatherproof actuator housing with electrical, 15 amp @125-VAC 60 HZ, prewired, single-pole-single-throw, supervisory switches
2. NPS 2 and Smaller: Ball or butterfly valve with bronze body with grooved ends. Basis of Design: Victaulic Series 728.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company.
3. NPS 2-1/2 and Larger: Butterfly valve with cast- or ductile-iron body; wafer type or with flanged or grooved ends.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company.

2.6 GENERAL-DUTY VALVES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company.
- B. Ball Valves NPS 2 and Smaller: MSS SP-110, 2-piece copper-alloy body with chrome-plated brass ball, 600-psig minimum CWP rating, blowout-proof stem, and threaded ends.

- C. Check Valves NPS 2 and Smaller: MSS SP-80, Type 4, Class 125 minimum, swing type with bronze body, nonmetallic disc, and threaded ends.
- D. Globe Valves NPS 2 and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, nonmetallic disc, and threaded ends.

2.7 SPRINKLERS

- A. Sprinklers shall be UL listed or FMG approved, with 175-psig minimum pressure rating. Basis of design Victaulic/Globe.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Victaulic Company or engineer approved equal
- C. Automatic Sprinklers: With glass bulb type heat-responsive element complying with the following:
 - 1. UL 199, for nonresidential applications.
- D. Wrenches shall be provided by the sprinkler manufacturer that directly engage the hex-shaped wrench boss integrally cast in the sprinkler body.
- E. Sprinkler types, features, and options as follows:
 - 1. Brass upright sprinklers.
 - 2. Concealed pendent sprinklers, including cover plate.
 - 3. Pendent sprinklers.
 - 4. Pendent, dry-type sprinklers.
 - 5. Quick-response sprinklers.
 - 6. Recessed sprinklers, including escutcheon.
 - 7. Sidewall sprinklers.
 - 8. Sidewall, dry-type sprinklers.
 - 9. Grooved heads as manufactured by Victaulic.
- F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
 - 1. Ceiling Mounting: 2 piece, with 1-inch vertical adjustment.
 - 2. Sidewall Mounting: 2 piece, with 1-inch vertical adjustment.
- G. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.
- H. In lieu of rigid connections to dry sprinkler heads, a Victaulic VicFlex™ dry sprinkler, Model VS1, may be used. The sprinkler shall provide a vertical or horizontal flexible connection with a bend radius to 2" and allow for up to 4 bends.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA standards, procedures, appendices, or recommendations.
- B. Report test results no later than two days following the test in writing.

3.2 EXAMINATION

- A. Examine walls and partitions for suitable thicknesses, fire- and smoke-rated construction, framing for hose-station cabinets, and other conditions where hose connections and stations are to be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PIPING APPLICATIONS, GENERAL

- A. Provide shop-welded joints where welded is required.
- B. Provide shop or manufacturer-threaded or grooved joints where threads are required.
- C. Do not use welded joints for galvanized-steel.
- D. Flanges, flanged fittings, unions, nipples, transition and special fittings with finish and pressure ratings same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.

3.4 SPRINKLER SYSTEM PIPING APPLICATIONS

- A. Wet-Pipe Sprinkler System, 175-psig Maximum Working Pressure:
 - 1. Sprinkler Piping NPS 2" and smaller use any of the following:
 - a. Threaded or grooved-end, black, schedule 40 steel pipe; cast- or malleable-iron threaded or grooved fittings; and threaded or grooved joints.
 - b. Plain-end, black, schedule 40 steel pipe; steel welding fittings; and welded joints.
 - c. Grooved-end, black, schedule 40 steel pipe with square-cut- or roll-grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.
 - 2. Sprinkler Piping NPS 2 1/2" and larger use any of the following:
 - a. Threaded or grooved-end, black, schedule 40 steel pipe; cast- or malleable-iron threaded or grooved fittings; and threaded or grooved joints.
 - b. Plain-end, black, schedule 10 steel pipe; steel welding fittings; and welded joints.
 - c. Grooved-end, black, Schedule 10 steel pipe; grooved-end fittings; grooved-end-pipe couplings; and roll grooved joints.

3.5 VALVE APPLICATIONS

- A. Where specific valve types are not indicated, the following requirements apply:
 - 1. Listed Fire-Protection Valves: UL listed and FMG approved for application.
 - a. Shutoff Duty: Use ball, or butterfly valves.

3.6 JOINT CONSTRUCTION

- A. Refer to Section "Common Work Results for Fire Suppression" for basic piping joint construction.
- B. Threaded or grooved Joints: Comply with NFPA 13 for pipe thickness and threads. Do not thread pipe smaller than 8" with wall thickness less than Schedule 40 unless approved by authorities having jurisdiction and threads may be checked by a ring gage and shall comply with ASME B1.20.1.
- C. Grooved Joints: Assemble joints with listed coupling and gasket, lubricant, and bolts.
 - 1. Steel Pipe: Square-cut or roll-groove piping as indicated. Use grooved-end fittings and rigid, grooved-end-pipe couplings, unless otherwise indicated.
- D. Dissimilar-Metal Piping Joints: Construct joints using dielectric fittings compatible with both piping materials.
 - 1. NPS 2 and Smaller: Use dielectric unions, couplings, or nipples.
 - 2. NPS 2-1/2 to NPS 4: Use dielectric flanges.
 - 3. NPS 5 and Larger: Use dielectric flange insulation kits.

3.7 PIPING INSTALLATION

- A. Refer to Section "Common Work Results for Fire Suppression" for basic piping installation.
- B. Locations and Arrangements: Drawing plans, shop drawings, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated.
 - 1. Deviations from approved working drawings for piping require written approval from authorities having jurisdiction and Architect. File written approval with Architect before deviating.
- C. Provide approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Provide unions adjacent to each valve in pipes 2" and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.

- E. Provide flanges or flange adapters on valves, and equipment having 2-1/2" and larger pipe connections.
- F. Provide "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve. Test connections that discharge to the exterior shall discharge 1'-0" above a concrete splash block. Provide splash block under this section of the specifications. Pipe penetration shall be installed to coursing dimensions where concrete masonry units are utilized to construct wall.
- G. Provide sprinkler piping with drains for complete system drainage.
- H. Provide alarm devices.
- I. Hangers and Supports: Refer to Section "Hangers and Supports for Fire-Suppression Piping" for hanger materials.
 - 1. Install sprinkler system piping according to NFPA 13.
- J. Earthquake Protection for Seismic Design Category C thru F: Install piping according to NFPA 13 to protect from earthquake damage.
- K. Install pressure gages on each riser or feed main, and at each sprinkler test connection. Include pressure gages with connection not less than 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 not subject to freezing.
- L. Fill wet-pipe sprinkler system piping with water.

3.8 VALVE INSTALLATION

- A. Install listed fire-protection valves, unlisted general-duty 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. Valves for Wall-Type Fire Hydrants: Install nonrising-stem gate valve in water-supply pipe.

3.9 SPRINKLER APPLICATIONS

- A. Use the following sprinkler types unless otherwise indicated:
 - 1. Rooms without Ceilings: Upright sprinklers.
 - 2. Rooms with Suspended Ceilings: Recessed pendent sprinklers.
 - 3. Wall Mounting: Recessed Sidewall sprinklers.
 - 4. Spaces Subject to Freezing: Dry pendent sprinklers.
 - 5. Special Applications: Extended-coverage, and quick-response sprinklers where required.
 - 6. Sprinkler Finishes:

- a. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough brass in unfinished spaces not exposed to view.
- b. Concealed Sprinklers: Rough brass, with factory white painted cover plate.
- c. Recessed Sprinklers: Chrome plated with matching two-piece escutcheon.

3.10 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in the center of acoustical ceiling panels and tiles.
- B. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space wherever possible. Otherwise, use , antifreeze sprinkler systems, or dry-pipe systems.

3.11 CONNECTIONS

- A. Install piping adjacent to equipment to allow service and maintenance.
- B. Connect water-supply piping to fire-suppression piping. Include backflow preventer between potable-water piping and fire-suppression piping.
- C. Ground equipment. Grounding shall be in accordance with section "Grounding and Bonding for Electrical Systems."
- D. Coordinate connection of wiring.
- E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.12 LABELING AND IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and NFPA 14 and "Common Work Results for Fire-Suppression" for piping identifications.

3.13 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system 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. Energize circuits to electrical equipment and devices.

4. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
5. Coordinate with fire alarm tests. Operate as required.

B. Report test results promptly and in writing to Architect and authorities having jurisdiction.

3.14 CLEANING AND PROTECTION

- A. Clean dirt and debris from sprinklers.
- B. Provide sprinklers to replace sprinklers with paint or coating other than the original factory finish.
- C. Protect sprinklers from damage and debris until Substantial Completion.
- D. Protect the building exterior when operating drains and test connections discharging to the building exterior.
- E. Dirt and stains on any surfaces resulting from the work of this section shall be cleaned and removed under this section.

3.15 DEMONSTRATION

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

END OF SECTION 211000