SECTION 210500

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Refer to drawings for detailed scope of work description.

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

1.2 APPLICABLE CODES AND STANDARDS

A. Comply with requirements on drawings.

1.3 ORDER OF PRECEDENCE

A. Should conflicts arise out of discrepancies between documents referenced in this specification, the most stringent requirement shall apply.

B. Should a level of stringency be indeterminable, the discrepancies shall be resolved as follows:

1. Local / State Codes and associated amendments shall take precedence over this specification.

2. NFPA standards shall take precedence over this specification.

3. This specification shall take precedence over the drawings.

1.4 SUMMARY

A. This Section includes elements common to Division 21 Fire Suppression Sections:

1. Common Division 21 Product requirements:

a. Pipe, tube, fittings, and joining materials

b. Pipe hangers and fasteners

c. Sleeves, stack-sleeve fittings, and sleeve-seal systems

d. Escutcheons

e. Grout

2. Common Division 21 General and Execution requirements.

1.5 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. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic.

1.6 SUBMITTALS

A. Submit Division 21 for action submittals prior to applying for authority having jurisdiction installation permits (where required) and system installation.

B. Submit Division 21 for informational submittals related to testing and inspections after successful system testing and prior to scheduling authority having jurisdiction final approval demonstration testing.

C. Submit Division 21 for closeout submittals as part of project closeout procedure.

1.7 ACTION SUBMITTALS

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

1.8 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.9 CLOSEOUT SUBMITTALS

A. Not used.

1.10 QUALITY ASSURANCE

A. Division 21 Drawings are diagrammatic. They are not intended to be absolutely precise; they are not intended to specify or to show every offset, fitting and component. The purpose of the drawings is to indicate a system concept, the main components of the system and the approximate geometrical relationships, provide all other components and materials necessary to make the systems fully complete and operational.

B. Where conflicts between referenced standards, codes, Division 21 Drawings, and Division 21 Specifications exist the most stringent shall apply unless approved in writing by the Engineer.

C. Division 21 Product Standards: Listed in the "Fire Protection Equipment Directory" published by UL or the "Approval Guide" published by FM Global.

1. Subject to compliance with requirements, indication of a UL product requirement within Division 21 shall be construed to be inclusive of a corresponding FM Global approved product, with or without UL listing.

D. Division 21 Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1. 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.

E. Division 21 Steel Pipe Welding Qualifications: 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 Piping."

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

F. Division 21 Steel Support Welding Qualifications: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

1.11 COORDINATION

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

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

1. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.

2. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

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

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

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

1. 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.

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

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

1.12 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.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

C. Pipe and fittings shall be protected from moisture. Pipe and fittings shall not be stored directly on ground. Pipe and fittings exposed to moisture and showing significant rust shall be removed from site, and shall not be installed.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Comply with individual Division 21 Sections for pipe, tube, and fitting materials.

2.2 PIPE JOINING MATERIALS

A. Comply with individual Division 21 Sections for joining materials.

2.3 PIPE HANGERS AND FASTENERS

A. Pipe Hangers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Tolco
    b. Cooper B-Line
    c. Anvil International
2. Material: Steel, galvanized.
3. Type: Adjustable band type and clevis; comply with Part 3 “Piping Support Installation” for applications.
4. Band type hangers used on CPVC piping shall have flared or beveled edges.

B. Hanger Rod:

1. Material: Carbon steel, galvanized.

C. Attachments to Steel:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Tolco
    b. Cooper B-Line
    c. Anvil International
2. Material: Carbon or malleable steel, galvanized.
3. Type: Beam clamp.

D. Drop in Anchors:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Hilti Corp
    b. ITW Red Head
    c. Powers Fastners, Inc.
2. Standard: UL 203.
3. Material: Mild steel with zinc plating.

E. Concrete Inserts (Cast-In):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Tolco
    b. Hilti Corp
    c. Powers Fasteners, Inc.
2. Material: Carbon steel, galvanized.

2.4 SLEEVES

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

1. Advance Products & Systems, Inc.
2. Calpico, Inc.
3. GPT, an EnPro Industries Co.

B. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, anticorrosion coated or galvanized, with plain ends and integral welded waterstop collar.

C. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.5 STACK-SLEEVE FITTINGS

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

1. Jay R. Smith Mfg. Co.
2. Zurn Industries, LLC.

B. Description: Manufactured, Dura-coated, Duco-coated, or galvanized cast-iron sleeve with integral clamping flange for use in waterproof floors and roofs. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.6 SLEEVE-SEAL SYSTEMS

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

1. Advance Products & Systems, Inc.
2. Calpico, Inc.
3. Metraflex Co.

B. Description:

1. Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
2. Designed to form a hydrostatic seal of 20 psig minimum.
3. Sealing Elements: Nitrile (Buna N) interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size.
4. Pressure Plates: Stainless steel, Type 316. Include two for each sealing element.
5. Connecting Bolts and Nuts: Stainless steel, Type 316, of length required to secure pressure plates to sealing elements.

2.7 ESCUTCHEONS

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

B. One-Piece, Galvanized-Steel Type: With hot-dipped galvanized-steel wall plate and setscrew fastener.

C. One-Piece, Stainless-Steel Type: With polished stainless-steel finish.

D. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.

2.8 GROUT

A. Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Install piping according to the following requirements and individual Division 21 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

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

C. 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.

D. Refer to equipment specifications in other Sections for rough-in requirements.

E. Field-verify final equipment locations of equipment for rough-in.

F. Select system components with pressure rating equal to or greater than system operating pressure.

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

H. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

I. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

J. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

K. Install piping to permit valve servicing.

L. Install piping at indicated slopes.

M. Install piping free of sags and bends.

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

O. Install piping to allow application of insulation.

P. At the end of each working day all pipe openings shall be covered or capped to minimize the likelihood of introduction of foreign materials into piping. All piping not covered or which has had covering damaged shall be visually inspected internally to confirm no obstructions have been introduced to the piping.

3.2 JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying 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 thread 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.

E. 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.

F. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Join flanges with gasket and bolts according to ASME B31.9.

H. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated.

2. Do not use welded joints for galvanized-steel pipe.

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

J. Plastic-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. Apply primer.

2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

K. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

3.3 PIPING SUPPORT INSTALLATION

A. Install hangers, fasteners, and structural attachments:

1. NPS 4 and larger: Use clevis type hangers only.

2. NPS 3 and smaller: Use clevis or adjustable band type hangers.

3. Install beam clamps with retaining straps regardless of seismic classification.

4. Powder-driven or pre-expanded inserts shall not be used.
5. Threaded connections shall not be used for attachments to concrete.

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

3.4 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
1. Exterior Concrete Walls above Grade: Use steel pipe sleeves.
2. Exterior Concrete Walls below Grade: Use steel pipe sleeves with sleeve-seal systems.
3. Concrete Slabs on Grade: Use steel pipe sleeves with sleeve-seal systems.
4. Concrete Slabs above Grade: Use steel pipe sleeves.
5. Interior Wall Partitions: Use galvanized-steel sheet sleeves.
6. Slabs with Waterproof Membrane: Comply with Part 3 “Stack-Sleeve Fitting Installation”.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to accommodate annular clear space required for installation of sleeve-seal system.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
1. Cut sleeves to length for mounting flush with both surfaces.
a. Exception: Extend sleeves installed in floors 2 inches above finished floor level.
2. Using grout, seal space outside of sleeves in slabs and walls.

D. Install sleeves for pipes passing through interior wall partitions.
1. Cut sleeves to length for mounting flush with both surfaces.
2. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.

E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke 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 Division 07.

3.5 STACK-SLEEVE FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs to be provided with membrane waterproofing as slabs are constructed.
1. Install fittings that are large enough to provide necessary annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Division 07.
3. Install section of cast-iron sleeve fittings to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Use silicone sealant to seal around the outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestop materials and installations in Division 07.

3.6 SLEEVE-SEAL SYSTEM INSTALLATION

A. Install sleeve seals systems in sleeves in exterior concrete walls at water-service piping entries into building.

B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.7 ESCUTCHEON INSTALLATION

A. Install escutcheons for penetrations of walls, ceilings, and floors.

B. Escutcheons for New Piping:

1. Bare Piping at Exterior Wall Penetrations: One-piece galvanized-steel wall plate.
2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece steel with chrome-plated finish.
    a. Corrosive Environments: One-piece stainless steel with polished stainless-steel finish.
3. Bare Piping in Unfinished Service Spaces and Equipment Rooms: No escutcheon.

C. Escutcheons for Existing Piping:

1. Bare Piping at Exterior Wall Penetrations: Split-Plate Stamped Steel with polished chrome plate finish.
2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-Plate Stamped Steel with polished chrome plate finish.
3. Bare Piping in Unfinished Service Spaces and Equipment Rooms: No escutcheon.

3.8 CONCRETE BASES

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

B. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.

C. 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.

D. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.

E. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

F. Install anchor bolts to elevations required for proper attachment to supported equipment.

G. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

H. Use 3000-psi, 28-day compressive-strength concrete and reinforcement. Comply with Division 03.

3.9 PAINTING

A. Comply with Division 09 for painting of fire-suppression systems, equipment, and components.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.10 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.

C. Field Welding: Comply with AWS D1.1.

END OF SECTION