SECTION 21 05 00
COMMON WORK RESULTS FOR FIRE-SUPPRESSION

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections "General Conditions to the Construction Contract", "Special Conditions" and "Division 01 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 SUMMARY

A. This Section includes the following basic fire-suppression materials and methods to complement other Division 21 Sections.

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Flexible connectors.
4. Equipment nameplate data requirements.
5. Labeling and identifying fire-suppression systems and equipment.
6. Field-fabricated metal equipment supports.
7. Installation requirements common to equipment specification sections.
8. Cutting and patching.
9. Painting - Touchup and finishing.

B. Pipe and pipe fitting materials are specified in Division 21 piping system Sections.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, 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 duct shafts.

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.

1.4 ACTION SUBMITTALS

A. Product Data: For dielectric fittings, flexible connectors, and firestopping materials.

B. Shop Drawings: Detail fabrication and installation for metal supports and anchorage for fire-suppression materials and equipment.

C. Coordination Drawings: Detail major elements, components, and systems of equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:

1. Planned piping layout, including valve and specialty locations and valve-stem movement.
2. Clearances for installing and maintaining insulation.
3. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
4. Equipment and accessory service connections and support details.
5. Exterior wall and foundation penetrations.
6. Fire-rated wall and floor penetrations.
7. Sizes and location of required concrete pads and bases.
8. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
9. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
10. Reflected ceiling plans to coordinate and integrate installation of air outlets and inlets, light fixtures, communication system components, sprinklers, and other ceiling-mounted items.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

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

C. 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.

1.6 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 prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

1.7 SEQUENCING AND SCHEDULING

A. Schedule and arrange water supply flow test at the site facility to obtain the current AND accurate water supply flow and pressure characteristics necessary to adequately design and size the new fire protection system for the new building facility.

B. Coordinate fire-suppression equipment installation with other building components.

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

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

E. Sequence, coordinate, and integrate installations of fire-suppression materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

F. Coordinate connection of fire-suppression systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

G. Coordinate requirements for access panels and doors if fire-suppression items requiring access are concealed behind finished surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Dielectric Unions:

    a. Capitol Manufacturing Co.
    b. Central Plastics Co.
    c. Eclipse, Inc.; Rockford-Eclipse Div.
    d. Epco Sales Inc.
    e. Hart Industries International, Inc.
    f. Watts Industries, Inc.; Water Products Div.
    g. Zurn Industries, Inc.; Wilkins Div.
    h. Or equal as approved by the Professional.

2. Dielectric Flanges:

    a. Capitol Manufacturing Co.
    b. Central Plastics Co.

c. Epco Sales Inc.
d. Watts Industries, Inc.; Water Products Div.
e. Or equal as approved by the Professional.

3. Dielectric-Flange Insulating Kits:

a. Calpico, Inc.
b. Central Plastics Co.
c. Or equal as approved by the Professional.

4. Dielectric Couplings:

a. Calpico, Inc.
b. Lochinvar Corp.
c. Or equal as approved by the Professional.

5. Dielectric Nipples:

a. Grinnell Corp.; Grinnell Supply Sales Co.
b. Perfection Corp.
c. Victaulic Co. of America.
d. Or equal as approved by the Professional.

6. Metal, Flexible Connectors:

a. Central Sprink, Inc.
b. Flexicraft Industries.
c. Flex-Weld, Inc.
d. Grinnell Corp.; Grinnell Supply Sales Co.
e. Hyspan Precision Products, Inc.
f. McWane, Inc.; Tyler Pipe; Gustin-Bacon Div.
g. Metraflex Co.
h. Or equal as approved by the Professional.

7. Fire-Stopping:

a. "Dow Corning Fire Stop Sealant"; Dow Corning Corp.
b. "3M Fire Barrier Caulk CP-25"; Electrical Products Div./3M.
c. "RTV 7403"; General Electric Co.
d. Or equal as approved by the Professional.

8. Fire-Stop Pipe Sleeves:

a. Pipe Shields, Inc.
b. Pro-Set, Inc.
c. Or equal as approved by the Professional.

2.2 PIPE AND PIPE FITTINGS

A. Refer to individual Division 21 piping Sections for pipe and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 21 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.

1. Sleeve: ASTM A 126, Class B, gray iron.
2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.
5. Finish: Enamel paint.

2.4 DIELECTRIC FITTINGS

A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.

C. Insulating Material: Suitable for system fluid, pressure, and temperature.

D. Dielectric Unions: Factory-fabricated, union assembly, for 150-psig minimum working pressure at 180 deg F.

E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150-psig minimum working pressure as required to suit system pressures.

F. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Provide separate companion flanges and steel bolts and nuts for 150-psig minimum working pressure as required to suit system pressures.

G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 150-psig minimum working pressure at 225 deg F.

H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 150-psig minimum working pressure at 225 deg F.

2.5 FLEXIBLE CONNECTORS

A. General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:

1. 2-Inch NPS and Smaller: Threaded.
2. 2-1/2-Inch NPS and Larger: Flanged.

B. Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose.

2.6 GROUT

A. Non-shrink, Nonmetallic Grout: ASTM C 1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psig, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.7 FIRE-STOPPING

A. Fire-Resistant Sealant: Provide one-part elastomeric sealant formulated for use in a through-penetration fire-stop system for filling openings around piping penetrations through walls and floors, having fire-resistance ratings equal to or greater than adjacent construction and as established by testing identical assemblies per ASTM E 814 by Underwriters Laboratory, Inc.

B. Fire-Stop Pipe Sleeves: At the option of the Contractor and if approved by local codes, prefabricated fire-stop pipe sleeves also may be utilized. Pipe sleeves shall be UL Listed and tested in accordance with ASTM E 814. Sleeves shall be adjustable and shall be filled with ceramic fiber material to provide insulation and fire stopping. Sleeves shall provide a 2-hour fire rating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 21 piping Sections specify unique piping installation requirements.

B. General Locations and Arrangements: 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. Due to the small scale of the drawings, it is not practical to indicate offsets, fittings, valves or similar items, to make a complete operating system. The drawings are generally diagrammatic and indicative of the work to be installed. The Contractor shall carefully investigate conditions affecting his work and shall install his work in such a manner that interference between pipes, conduit, ducts, equipment, architectural and structural features will

be avoided and shall furnish and install such offsets or fittings to meet the conditions at the building, so as to avoid interference without additional cost to the Client Agency.

C. Install piping at indicated or required slope.

D. Install components with pressure rating equal to or greater than system operating pressure.

E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

F. Install piping free of sags and bends.

G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

I. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

J. Install fittings for changes in direction and branch connections.

K. Install couplings according to manufacturer's written instructions.

L. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials.

M. Verify final equipment locations for roughing-in.

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

O. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. 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:

    a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
    b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
    c. Align threads at point of assembly.
    d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
    e. 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.

4. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and

gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

P. Piping Connections: Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Client Agency.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install fire-suppression equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment giving right of way to piping installed at required slope.

F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

3.3 PAINTING AND FINISHING

A. Refer to Division 09 Section "Painting - Exterior and Interior" for paint materials, surface preparation, and application of paint. Paint all exposed fire protection lines "Red" unless otherwise directed by the Professional.

B. Refer to Division 21 Section "Fire Protection System Identification" for fire protection color schemes.

C. Apply paint to exposed piping according to the following, unless otherwise indicated:

1. Interior, Ferrous Piping: Use semi-gloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
2. Interior, Galvanized-Steel Piping: Use semi-gloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
3. Interior, Ferrous Supports: Use semi-gloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
4. Exterior, Ferrous Piping: Use semi-gloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.

5. Exterior, Galvanized-Steel Piping: Use semi-gloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
6. Exterior, Galvanized-Steel Supports: Use semi-gloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.

D. Do not paint piping specialties with factory-applied finish.

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

3.4 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

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

C. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

D. Structural steel members installed at the exterior of the building or in damp or wet locations shall be hot dipped galvanized after fabrication. Conform to ASTM A123. Where exterior structural steel members are cut, drilled or welded, or galvanizing is damaged, repair with a cold galvanizing repair compound with dry film containing not less than 93 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20, as manufactured by ZRC Products Company, or equivalent.

3.5 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for fire-suppression installations. Perform cutting by skilled mechanics of trades involved.

B. Repair cut surfaces to match adjacent surfaces.

3.6 GROUTING

A. Install nonmetallic, nonshrink, grout for fire-suppression equipment base bearing surfaces, equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placing of grout.

E. Place grout on concrete bases to provide smooth bearing surface for equipment.

F. Place grout around anchors.

G. Cure placed grout according to manufacturer's written instructions.

END OF SECTION