SECTION 400506 - COUPLINGS, ADAPTERS, AND SPECIALS FOR PROCESS PIPING

Note that this section has only been edited for NYSOGS standardization and has not been technically edited. The designer shall make all technical edits specific to the project for this section.

This Section includes pipe penetrations, restrained joints, flexible connections, expansion joints and loops, and sleeve-type couplings.

Individual piping systems in process industries (sanitary, raw water, and drainage) may be defined on Drawings by using a pipe schedule that describes piping components required for that system and provides other relevant data such as pressure-testing requirements and applicable valving requirements. A sample pipe schedule is provided following END OF SECTION.

Piping for Site utilities is specified in Division 33, plumbing piping is specified in Division 22, and process piping is specified in Division 40.

Delete firestopping requirements if firestopping is to be specified in Section 078400.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes:

Pipe penetrations.

Restrained joints.

Flexible connections.

Expansion joints.

Expansion loops.

Sleeve-type couplings.

* + - * 1. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 055000 - Metal Fabrications: Miscellaneous metalwork and fasteners as required by this Section.

Section 078400 - Firestopping: Penetrations through fire-rated materials.

Section 079000 - Joint Protection: Sleeve sealant for pipe penetrations.

Section 330110.58 - Disinfection of Water Utility Piping Systems: Disinfection of potable water piping.

Section 400519 - Ductile Iron Process Pipe: Ductile-iron piping materials and appurtenances.

Section 400523 - Stainless Steel Process Pipe and Tubing: Stainless steel piping materials and appurtenances.

Section 400524 - Steel Process Pipe: Steel piping materials and appurtenances.

Section 400531 - Thermoplastic Process Pipe: Plastic piping materials and appurtenances.

Section 400551 - Common Requirements for Process Valves: Common product requirements for valves for placement by this Section.

Section 404213 - Process Piping Insulation: Piping insulation as required by this Section.

* + - 1. DEFINITIONS

Limit list of definitions to terms unique to this Section and not provided elsewhere.

* + - * 1. Firestopping (Through-Penetration Protection System): The sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire-rated construction.
        2. FM: Factory Mutual Insurance Company; FM Global is the communicative name of the company.
        3. WH: Warnock Hersey; indicates compliance to relevant building codes, association criteria, and product safety and performance standards.
      1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

* + - * 1. American Water Works Association:

AWWA C219 - Bolted, Sleeve-Type Couplings for Plain-End Pipe.

* + - * 1. American Welding Society:

AWS D1.1 - Structural Welding Code - Steel.

* + - * 1. ASME International:

ASME A13.1 - Scheme for the Identification of Piping Systems.

ASME B31.3 - Process Piping.

ASME B31.9 - Building Services Piping.

ASME Boiler and Pressure Vessel Code (BPVC), Section IX - Welding, Brazing, and Fusing Qualifications.

* + - * 1. ASTM International:

ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.

ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.

ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

* + - * 1. Expansion Joint Manufacturers Association, Inc.:

EJMA Standards.

* + - * 1. NSF International:

NSF 61 - Drinking Water System Components - Health Effects.

NSF 372 - Drinking Water System Components - Lead Content.

* + - * 1. UL:

UL 263 - Fire Tests of Building Construction and Materials.

UL 1479 - Fire Tests of Through-Penetration Firestops.

UL 2079 - Tests for Fire Resistance of Building Joint Systems.

* + - 1. COORDINATION
         1. Coordinate Work of this Section with installation of valves and equipment.
      2. PREINSTALLATION MEETINGS
         1. Convene minimum [**one week**] <**\_\_\_\_\_\_\_\_**> [**weeks**] prior to commencing Work of this Section.
      3. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
        2. Manufacturer’s installation instructions shall be provided along with product data.
        3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
        4. Product Data:

Submit manufacturer catalog information for each specified product.

Firestopping: Submit data on product characteristics, performance, and limitation criteria.

Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.

Expansion Joints: Indicate maximum temperature, pressure rating, and expansion compensation.

* + - * 1. Shop Drawings:

Identification:

Submit list of wording, symbols, letter size, and color coding for pipe identification.

Comply with ASME A13.1.

Indicate restrained joint details and materials.

Submit layout drawings showing piece numbers and location, indicating restrained joint locations.

Indicate layout of piping systems, including flexible connectors, expansion joints and compensators, loops, offsets, and swing joints.

* + - * 1. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings for maintenance of fire-resistance rating of adjacent assembly.

Include following Paragraph for submission of physical samples for selection of finish, color, texture, and other properties.

* + - * 1. Samples:

Pipe Restraints: Submit [**two**] <**\_\_\_\_\_\_\_\_**> samples of joint restraint parts.

Compensators: Submit [**two**] <**\_\_\_\_\_\_\_\_**> low-pressure compensators, [3/4] [1] [1-1/4] <\_\_\_\_\_\_\_\_> [inch] [inches] in size.

* + - * 1. Manufacturer's Certificate: Certify that [**products**] [**isolators**] <**\_\_\_\_\_\_\_\_**> meet or exceed specified requirements.
        2. Welder Certificates: Certify welders and welding procedures employed on Work, verifying [**AWS**] [**ASME**] qualification within previous 12 months.

Include separate Paragraphs for additional certifications.

Include following Paragraph when Contractor is responsible for designing products or assemblies. List affected products when Section specifies more than one product.

* + - * 1. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for:

Flexible connectors.

Expansion joints.

Pipe Restraints:

Determine restrained lengths and submit joint restraint details.

Use joint restraint devices specifically designed for applications as described in manufacturer data.

Firestopping Engineering Judgments: For conditions not covered by UL- or WH-listed designs, submit judgments by licensed professional engineer suitable for presentation to authority having jurisdiction to accept as meeting fire-protection code requirements.

* + - * 1. Manufacturer Instructions: Submit special procedures and setting dimensions.
        2. Source Quality-Control Submittals: Indicate results of [**shop**] [**factory**] tests and inspections.
        3. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
        4. Qualifications Statements:

Coordinate following Subparagraphs with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer, installer, and licensed professional.

Submit manufacturer's approval of installer.

Welders: Qualify procedures and personnel according to [**ASME BPVC-IX**] [**AWS D1.1**].

* + - 1. CLOSEOUT SUBMITTALS
         1. Project Record Documents: Record actual locations of piping appurtenances.
         2. Identify and describe unexpected variations to pipe routing or discovery of uncharted utilities.
      2. QUALITY ASSURANCE

Include this Article to specify compliance with overall reference standards affecting products and installation included in this Section.

* + - * 1. Materials in Contact with Potable Water: Certified to NSF Standards 61 and 372.
        2. Perform Work according to ASME B31.9 for installation of piping systems and according to [**ASME BPVC-IX**] [**AWS D1.1**] for welding materials and procedures.
        3. Perform Work according to [**ASME B31.3**] [**ASME B31.9**] [**and**] <**\_\_\_\_\_\_\_\_**> [**code**] [**applicable code**] for installation of piping systems.
        4. Through-Penetration Firestopping of Fire-Rated Assemblies:

Comply with [**UL 1479**] [**or**] [**ASTM E814**].

Minimum Positive Pressure Differential: 0.1-inch wg to achieve fire F-ratings and temperature T-ratings as indicated on Drawings, but not less than one hour.

Wall Penetrations: Fire F-ratings as indicated on Drawings, but not less than one hour.

Fire-rated firestopping may not be required for non-rated floors and roofs. Coordinate with following non-fire-rated assemblies.

Floor [**and Roof**] Penetrations:

Fire F-ratings and Temperature T-ratings: As indicated on Drawings, but not less than one hour.

Floor Penetrations within Wall Cavities: T-rating is not required.

Some code construction types do not require fire-rated floor and roof assemblies. Coordinate with applicable code.

* + - * 1. Through-Penetration Firestopping of Non-fire-rated Floor [**and Roof**] Assemblies:

Materials to resist free passage of flame and products of combustion.

Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.

Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.

Some codes permit compliance with more than one reference standard. Coordinate references with applicable code.

* + - * 1. Fire-Resistive Joints in Fire-Rated Floor, Roof, and Wall Assemblies:

Comply with [**ASTM E1966**] [**or**] [**UL 2079**].

Rating: As indicated on Drawings for assembly in which joint is installed.

* + - * 1. Fire-Resistive Joints between Floor Slabs and Exterior Walls:

Comply with ASTM E119.

Minimum Positive Pressure Differential: 0.1-inch wg to achieve fire-resistance rating as indicated on Drawings for floor assembly.

* + - * 1. Surface-Burning Characteristics: Maximum 25/450 flame-spread/smoke-developed index when tested according to ASTM E84.

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Perform Work according to <**\_\_\_\_\_\_\_\_**> standards.

Include following Paragraph only when cost of acquiring specified standards is justified.

* + - * 1. Maintain <**\_\_\_\_\_\_\_\_**> [**copy**] [**copies**] of each standard affecting Work of this Section on Site.
      1. QUALIFICATIONS

Coordinate following Paragraphs with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
        2. Installer: Company specializing in performing Work of this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience [**and approved by manufacturer**].
        3. Welders: [**AWS**] [**ASME**] qualified within previous 12 months for employed weld types.
        4. Licensed Professional: [**Professional engineer**] <**\_\_\_\_\_\_\_\_**> experienced in design of specified Work and licensed [**at Project location**] [**in State of**] <**\_\_\_\_\_\_\_\_**>.
      1. DELIVERY, STORAGE, AND HANDLING
         1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
         2. Store materials according to manufacturer instructions.
         3. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Furnish temporary end caps and closures on piping and fittings and maintain in place until installation.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
         1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

* + - 1. WARRANTY

This Article extends warranty period beyond one year. Extended warranties may increase construction costs and State enforcement responsibilities. Specify warranties with caution.

* + - * 1. Furnish [**five**] <**\_\_\_\_\_\_\_\_**>-year manufacturer's warranty for <**\_\_\_\_\_\_\_\_**>.

1. PRODUCTS
   * + 1. PIPE PENETRATIONS
          1. Performance and Design Criteria:

Firestopping Materials: As specified in Section 078400 - Firestopping.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Firestopping Materials:

Comply with [**ASTM E119**] [**ASTM E814**] [**UL 263**] [**UL 1479**] to achieve fire ratings as indicated on Drawings for adjacent construction, but not less than one hour.

[**Ratings may be three hours for firestopping in through-penetrations of four-hour fire-rated assemblies, unless otherwise required by applicable codes.**]

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Subparagraph, referenced FM, UL, or WH design number can be indicated in schedule following END OF SECTION or on Drawings.

Firestopping Materials:

Comply with [**ASTM E119**] [**ASTM E814**] [**UL 263**] [**UL 1479**] to achieve fire ratings:

Of adjacent construction.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

As indicated on schedule following END OF SECTION.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

According to [**FM**] [**UL**] [**WH**] design numbers as indicated on [**Drawings**] [**schedule following END OF SECTION**].

Firestop interruptions to fire-rated assemblies, materials, and components.

Consider using following Subparagraph only if authorities having jurisdiction have special approval requirements.

Firestopping: Provide certificate of compliance from authority having jurisdiction, indicating approval of materials used.

* + - * 1. Flashing:

Metal Flashing:

Material: Galvanized steel.

Thickness: [26] <\_\_\_\_\_\_\_\_> gage.

Metal Counterflashing:

Material: Galvanized steel.

Thickness: [22] <\_\_\_\_\_\_\_\_> gage.

Lead Flashing:

Material: Sheet lead.

Weight:

Waterproofing: 5 psf.

Soundproofing: 1 psf.

Flexible Flashing Materials:

Material: [**Butyl sheet**] <**\_\_\_\_\_\_\_\_**> [**Compatible with service conditions**].

Thickness: [47] <\_\_\_\_\_\_\_\_> mils.

Caps:

Material: Steel.

Minimum Thickness: 22 gage, and 16 gage at fire-resistive elements.

* + - * 1. Sleeves:

Sleeves for Pipes through Non-fire-rated Floors:

Material: Galvanized steel.

Thickness: 18 gage.

Sleeves for Pipes through Non-fire-rated Beams, Walls, Footings, and Potentially Wet Floors:

Steel pipe.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

[18] <\_\_\_\_\_\_\_\_>-gage galvanized steel.

Following sealant may not be applicable for every application. Edit following Subparagraph to suit Project requirements.

Sealant:

Type: [**Acrylic**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Mechanical Sleeve Seals:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=12682&mf=04&src=wd):

designer to provide two manufacturers and approved equivalent for all listed products.

Description:

Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve.

Connection: Bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

* + - 1. FLEXIBLE CONNECTIONS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12683&mf=04&src=wd):

designer to provide two manufacturers and approved equivalent for all listed products.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Steel Piping:

Inner Hose: [**Carbon steel**] [**Stainless steel**] [**Bronze**] <**\_\_\_\_\_\_\_\_**>.

Exterior Sleeve: [**None**] [**Single-braided**] [**Double-braided**] [**stainless steel**] [**bronze**] <**\_\_\_\_\_\_\_\_**>.

Pressure Rating: [**125 psig WSP at 450 degrees F**] [**200 psig WOG at 250 degrees F**] [**\_\_\_\_\_\_\_\_ psig at 70 degrees F**].

Joints: [**Flanged**] [**Threaded**] [**Threaded with union**] [**Welded**] [**As specified for pipe joints**] [**As specified in Section**] <**\_\_\_\_\_\_\_\_\_\_\_\_**>.

Size: [**Use pipe-sized units**] <**\_\_\_\_\_\_\_\_**>.

Maximum Offset: [3/4] [1] <\_\_\_\_\_\_\_\_> inch on each side of installed center line.

* + - * 1. Copper Piping:

Inner Hose: Bronze.

Exterior Sleeve: Braided bronze.

Pressure Rating: [**125 psig WSP at 450 degrees F**] [**200 psig WOG at 250 degrees F**] [**\_\_\_\_\_\_\_\_ psig at 70 degrees F**].

Joints: [**Flanged**] [**Threaded**] [**Threaded with union**] [**Soldered**] [**As specified for pipe joints**] [**As specified in Section**] <**\_\_\_\_\_\_\_\_\_\_\_\_**>.

Size: [**Use pipe-sized units**] <**\_\_\_\_\_\_\_\_**>.

Maximum Offset: [3/4] [1] <\_\_\_\_\_\_\_\_> inch on each side of installed center line.

* + - 1. EXPANSION JOINTS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12684&mf=04&src=wd):

designer to provide two manufacturers and approved equivalent for all listed products.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Performance and Design Criteria:

Bellow Design: According to Section C of EJMA Standards.

* + - * 1. Stainless-Steel Bellows Type:

Pressure Rating: [**125 psig WSP at 400 degrees F**] [**200 psig WOG at 250 degrees F**].

Maximum Compression: [1-3/4] [3] inches.

Maximum Extension: 1/4 inch.

Joint: [**Flanged**] [**Threaded**] [**Welded**] [**As specified for pipe joints**] [**As specified in Section**] <**\_\_\_\_\_\_\_\_\_\_\_\_**>.

Size: [**Use pipe-sized units**] <**\_\_\_\_\_\_\_\_**>.

Application: Steel piping 3 inches and smaller.

* + - * 1. External Ring-Controlled Stainless-Steel Bellows Type:

Pressure Rating: [**125 psig WSP at 400 degrees F**] [**200 psig WOG at 250 degrees F**] [**225 psig at 70 degrees F**].

Maximum Compression: [15/16 inch] [1-1/4 inches].

Maximum Extension: [5/16] [3/8] inch.

Maximum Offset: [1/8] [5/16] <\_\_\_\_\_\_\_\_> inch.

Joint: Flanged.

Size: [**Use pipe-sized units**] <**\_\_\_\_\_\_\_\_**>.

Accessories: Internal flow liner.

Application: Steel piping 3 inches and larger.

* + - * 1. [**Single**] [**Double**]-Sphere [**Elbow**] [**Flexible**] Compensators:

Body: [**PTFE**] [**Neoprene and nylon**] <**\_\_\_\_\_\_\_\_**>.

Working Pressure: <\_\_\_\_\_\_\_\_> psig.

Maximum Temperature: <\_\_\_\_\_\_\_\_> degrees F.

Maximum Compression: [1/2 inch] [3/4 inch] [1 inch] [1-1/8 inches].

Maximum Elongation: [3/8] [1/2] [5/8] [7/8] inch.

Maximum Offset: [3/8] [1/2] [3/4] [7/8] inch.

Maximum Angular Movement: [**15**] [**30**] [**45**] degrees.

Joint: [**Tapped steel flanges**] [**Galvanized flanges**] [**Galvanized unions**].

Size: [**Use pipe-sized units**] <**\_\_\_\_\_\_\_\_**>.

Accessories: Control [**rods**] [**cables**].

Application: Steel piping 2 inches and larger.

* + - * 1. Two-Ply Bronze Bellows Type:

Description: Bronze with anti-torque device, limit stops, and internal guides.

Pressure Rating: [**125 psig WSP at 400 degrees F**] [**200 psig WOG at 250 degrees F**].

Maximum Compression: [1-3/4] [3] inches.

Maximum Extension: 1/4 inch.

Size: [**Use pipe-sized units**] <**\_\_\_\_\_\_\_\_**>.

Application: Copper piping.

* + - * 1. Low-Pressure Compensators with Two-Ply Bronze Bellows:

Working Pressure: [75] [80] psig.

Maximum Temperature: [250] [400] degrees F.

Maximum Compression: 1/2 inch.

Maximum Extension: 5/32 inch.

Joint: Soldered.

Size: [**Use pipe-sized units**] <**\_\_\_\_\_\_\_\_**>.

Application: Copper or steel piping 2 inches and smaller.

* + - * 1. Copper with Packed Sliding Sleeve:

Maximum Temperature: 250 degrees F.

Joints: [**Flanged**] [**Threaded**] [**As specified for pipe joints**] [**As specified in Section**] <**\_\_\_\_\_\_\_\_\_\_\_\_**>.

Size: [**Use pipe-sized units**] <**\_\_\_\_\_\_\_\_**>.

Application: Copper or steel piping 2 inches and larger.

* + - 1. EXPANSION LOOPS
         1. Provide expansion loops as indicated on [**Shop**] Drawings.
      2. SLEEVE-TYPE COUPLINGS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12685&mf=04&src=wd):

designer to provide two manufacturers and approved equivalent for all listed products.

Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Comply with AWWA C219.

Middle Ring: [**Steel**] [**Ductile iron**].

Followers: [**Steel**] [**Ductile iron**].

Gaskets:

Material: [**Buna-N**] [**EPDM**] <**\_\_\_\_\_\_\_\_**> [**Compatible with service conditions**].

Comply with ASTM D2000.

Bolts: Steel.

* + - * 1. Finishes:

Buried Couplings: Factory epoxy coated.

* + - 1. INSULATION
         1. As specified in Section 404213 - Process Piping Insulation.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. As indicated on [**Drawings**] [**Shop Drawings**] [**pipe schedule**].
      1. SOURCE QUALITY CONTROL
         1. Provide shop inspection and testing of completed assemblies.

Include one or both of following Paragraphs to require Director’s Representative's inspection or witnessing of test at factory.

* + - * 1. Director’s Inspection:

Make completed <**\_\_\_\_\_\_\_\_**> available for inspection at manufacturer's factory prior to packaging for shipment.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspection is allowed.

* + - * 1. Director’s Witnessing:

Allow witnessing of factory inspections and test at manufacturer's test facility.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspections and tests are scheduled.

Include following Paragraph if reliance on fabricator's approved quality-control program is sufficient for Project requirements.

* + - * 1. Certificate of Compliance:

If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

Specified shop tests are not required for Work performed by approved manufacturer.

1. EXECUTION
   * + 1. EXAMINATION
          1. Verify that field dimensions are as indicated on [**Shop**] Drawings.
          2. Inspect existing flanges for nonstandard bolthole configurations or design and verify that new pipe and flanges mate properly.
          3. Verify that openings are ready to receive sleeves [**and firestopping**].
          4. Verify that pipe plain ends to receive sleeve-type couplings are smooth and round for 12 inches from pipe ends.
          5. Verify that pipe outside diameter conforms to sleeve manufacturer's requirements.
       2. PREPARATION
          1. Cleaning: Thoroughly clean end connections before installation.
          2. Close pipe and equipment openings with caps or plugs during installation.
          3. Surface Preparation: Clean surfaces to remove foreign substances.
       3. INSTALLATION
          1. According to [**ASME B31.3**] [**ASME B31.9**] <**\_\_\_\_\_\_\_\_**>.
          2. Pipe Penetrations:

Flashing:

Provide flexible flashing and metal counterflashing where piping penetrates weatherproofed or waterproofed walls, floors, and roofs.

Flash floor drains with topping over finished areas with lead, 10 inches clear on sides, with minimum 36-by-36-inch sheet size.

Fasten flashing to drain clamp device.

Sleeves:

Exterior Watertight Entries: Seal with mechanical sleeve seals.

Set sleeves in position in forms and provide reinforcement around sleeves.

Size sleeves large enough to allow for movement due to expansion and contraction and provide for continuous insulation wrapping.

Extend sleeves through floors [1 inch] <\_\_\_\_\_\_\_\_> [inches] above finished floor level and calk sleeves.

Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent Work with [**stuffing**] [**firestopping**] insulation and calk [**airtight**].

Provide close-fitting metal collar or escutcheon covers at both sides of penetration.

Install [**chrome-plated steel**] [**plastic**] [**stainless-steel**] escutcheons at finished surfaces.

* + - * 1. Firestopping:

Materials: As specified in Section 078400 - Firestopping.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Install material at fire-rated construction perimeters and openings containing penetrating sleeves, piping, and other items requiring firestopping.

Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

Apply firestopping material in sufficient thickness [**and to uniform density and texture**] to achieve required fire and smoke rating.

Placement: Compress fibered material to maximum 40 percent of its uncompressed size.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Placement:

Place foamed material in layers to ensure homogenous density, filling cavities and spaces.

Place sealant to completely seal junctions with adjacent dissimilar materials.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Placement: Place intumescent coating in sufficient coats to achieve rating required.

[**Remove dam material after firestopping material has cured**] [**Dam material to remain**].

Fire-Rated Surfaces:

Seal opening at [**floor**] [**wall**] [**partition**] [**ceiling**] [**and**] [**roof**].

Install sleeve through opening and extend beyond minimum of 1 inch on both sides of building element.

Size sleeve, allowing minimum of 1 inch void between sleeve and building element.

Pack void with backing material.

Seal ends of sleeve with UL-listed, fire-resistive silicone compound to meet fire rating of structure penetrated.

Non-rated Surfaces:

Seal opening through non-fire-rated [**wall**] [**partition**] [**floor**] [**ceiling**] [**and**] [**roof**].

Install sleeve through opening and extend beyond minimum of 1 inch on both sides of building element.

Size sleeve to allow minimum of 1 inch void between sleeve and building element.

Install type of firestopping material recommended by manufacturer.

Occupied Spaces:

Install [**escutcheons**] [**floor plates**] [**or**] [**ceiling plates**] where conduit penetrates non-fire-rated surfaces in occupied spaces.

Occupied spaces include rooms with finished ceilings and rooms where penetration occurs below finished ceiling.

Exterior Wall Openings below Grade: Assemble rubber links of mechanical sealing device to size of piping and tighten in place according to manufacturer instructions.

Interior Partitions:

Seal pipe penetrations at [**clean rooms,**] [**laboratories,**] [**computer rooms,**] [**telecommunication rooms,**] [**data rooms,**] [**and**] <**\_\_\_\_\_\_\_\_**>.

Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

* + - * 1. Flexible Connections: Install flexible couplings at connections to equipment and where indicated on [**Shop**] Drawings.
        2. Expansion Joints:

Install flexible couplings and expansion joints at connections to equipment and where indicated on [**Shop**] Drawings.

If expansion joint is supplied with internal sleeve, indicate flow direction on outside of joint.

* + - * 1. Air Release and Vacuum Breakers: Provide vacuum breakers [**on all tanks and process equipment**] [**as indicated on Drawings**] [**as indicated on Shop Drawings**].
        2. Backflow Preventers:

Install with nameplate and test cock accessible.

Install according to local code requirements.

[**Do not install in vertical position.**]

* + - * 1. Insulation: As specified in Section 404213 - Process Piping Insulation.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Insulation: As indicated on [**Drawings**] [**Shop Drawings**] [**pipe schedule**].
      1. FIELD QUALITY CONTROL
         1. After installation, inspect for proper supports and interferences.
         2. Repair damaged coatings with material equal to original coating.
      2. CLEANING
         1. Keep equipment interior clean as installation progresses.
      3. ATTACHMENTS

When relying on separate schedules, tables, illustrations, or forms to specify product requirements, include list of each attachment. Include identical list of attachments in Project Manual table of contents.

Insert attachments following END OF SECTION. Consider following example when developing Project schedule.

* + - * 1. Pipe Schedule:

Ductile Iron:

Material No.: 11.

Reference Standard: AWWA C115.

Joints:

Type: Mechanical.

AWWA C110 and C111.

Fittings:

Material: Ductile iron.

AWWA C110.

Gaskets: Rubber.

Test Pressure: 200 psig.

Copper:

Material No.: 17.

Type: Seamless.

Reference Standard: ASTM B251.

Joints: Brazed.

Fittings:

Material: Wrought copper.

ASME B16.29.

Test Pressure: 200 psig.

PVC:

Material No.: 21.

Reference Standard: ASTM D1785.

Joints: Solvent weld.

Fittings:

Material: Cast iron.

AWWA C111.

Test Pressure: 125 psig.

END OF SECTION 400506