SECTION 220500

COMMON WORK RESULTS FOR PLUMBING

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 1 Specification with completely editable text; therefore, any portion of the text can be modified by the A/E preparing the Solicitation Package to suit the project.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

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1. GENERAL
	1. SUMMARY
		1. This Section includes the following:
			1. Piping materials and installation instructions common to most piping systems.
			2. Dielectric fittings.
			3. Mechanical sleeve seals.
			4. Sleeves.
			5. Escutcheons.
			6. Grout.
			7. Equipment installation requirements common to equipment sections.
			8. Plumbing identification.
			9. Concrete bases.
			10. Supports and anchorages.
	2. DEFINITIONS
		1. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
		2. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.
		3. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
		4. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
		5. 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.
	3. SUBMITTALS
		1. Welding certificates.
	4. QUALITY ASSURANCE
		1. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
		2. 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.
		3. Electrical Characteristics for Plumbing 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.
2. PRODUCTS
	1. PIPE, TUBE, AND FITTINGS
		1. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
		2. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.
	2. JOINING MATERIALS
		1. Refer to individual Division 22 piping Sections for special joining materials not listed below.
		2. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
		3. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
		4. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.
		5. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.
		6. Welding Filler Metals: Comply with AWS D10.12.
		7. Solvent Cements for Joining Plastic Piping:
			1. ABS Piping: ASTM D2235.
			2. CPVC Piping: ASTM F493.
			3. PVC Piping: ASTM D2564. Include primer according to ASTM F656.
			4. PVC to ABS Piping Transition: ASTM D3138.
	3. DIELECTRIC FITTINGS
		1. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
		2. Insulating Material: Suitable for system fluid, pressure, and temperature.
		3. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
		4. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
		5. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
		6. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.
	4. MECHANICAL SLEEVE SEALS
		1. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
		2. Sealing Elements: [EPDM] [NBR] interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
		3. Pressure Plates: [Plastic] [Carbon steel] [Stainless steel]. Include two for each sealing element.
		4. Connecting Bolts and Nuts: [Carbon steel with corrosion-resistant coating] [Stainless steel] of length required to secure pressure plates to sealing elements. Include one for each sealing element.
	5. SLEEVES
		1. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
		2. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, galvanized, plain ends.
		3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
		4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
			1. Underdeck Clamp: Clamping ring with set screws.
		5. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
		6. PVC Pipe: ASTM D1785, Schedule 40.
		7. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.
	6. ESCUTCHEONS
		1. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
		2. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
		3. One-Piece, Cast-Brass Type: With set screw.
			1. Finish: [Polished chrome-plated] [Rough brass] [Polished chrome-plated and rough brass].
		4. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
			1. Finish: [Polished chrome-plated] [Rough brass] [Polished chrome-plated and rough brass].
	7. GROUT
		1. Description: ASTM C1107, Grade B, non-shrink, and nonmetallic, dry hydraulic-cement grout.
			1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
			2. Design Mix: 5000-psi, 28-day compressive strength.
			3. Packaging: Premixed and factory packaged.
	8. PLUMBING IDENTIFICATION
		1. Equipment Nameplates: Laminated three-layer plastic with engraved [black] [\_\_\_\_\_] letters on light contrasting background color.
		2. Tags
			1. Plastic Tags: Laminated three-layer plastic with engraved [black] [\_\_\_\_\_] letters on light contrasting background color. Tag size minimum 1-1/2 inches [diameter] [square] [\_\_\_\_\_\_\_\_\_].
			2. Metal Tags: Brass, Aluminum, or Stainless Steel [\_\_\_\_\_\_\_\_\_\_] with stamped letters; tag size minimum 1-1/2 inches diameter or square with smooth edges.
			3. Information Tags: Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches with grommet and self-locking nylon ties.
			4. Tag Chart: Typewritten letter size list in anodized aluminum frame and plastic laminated.
		3. Pipe Markers
			1. Color and Lettering: Conform to ASME A13.1.
			2. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
			3. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings with flow direction.
			4. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
3. EXECUTION

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**NOTE TO SPECIFIER**

The following systems need to be customized and/or selected for each project. Select the applicable system and submit to USPS Project Manager.

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* 1. PLUMBING DEMOLITION
		1. Refer to Division 1 Section "Cutting and Patching" and Division 2 Section "Selective Structure Demolition" for general demolition requirements and procedures.
		2. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
			1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
			2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
			3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
			4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
			5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
		3. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.
	2. PIPING SYSTEMS - COMMON REQUIREMENTS
		1. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
		2. 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.
		3. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
		4. 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.
		5. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
		6. Install piping to permit valve servicing.
		7. Install piping at indicated slopes.
		8. Install piping free of sags and bends.
		9. Install fittings for changes in direction and branch connections.
		10. Install piping to allow application of insulation.
		11. Select system components with pressure rating equal to or greater than system operating pressure.
		12. Install escutcheons for penetrations of walls, ceilings, and floors.
		13. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
		14. 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.
		15. 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.
		16. 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 7 Section "Penetration Firestopping" for materials.
		17. Verify final equipment locations for roughing-in.
		18. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
	3. PIPING JOINT CONSTRUCTION
		1. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
		2. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
		3. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
		4. Soldered Joints: Apply ASTM B813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B32.
		5. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
		6. 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. Do not use pipe sections that have cracked or open welds.
		7. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
		8. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
		9. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
			1. Comply with ASTM F402, for safe-handling practice of cleaners, primers, and solvent cements.
			2. ABS Piping: Join according to ASTM D2235 and ASTM D2661 Appendixes.
			3. CPVC Piping: Join according to ASTM D2846/D2846M Appendix.
			4. PVC Pressure Piping: Join schedule number ASTM D1785, PVC pipe and PVC socket fittings according to ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D2855.
			5. PVC Nonpressure Piping: Join according to ASTM D2855.
			6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D3138 Appendix.
		10. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D3139.
		11. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D3212.
		12. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D2657.
			1. Plain-End Pipe and Fittings: Use butt fusion.
			2. Plain-End Pipe and Socket Fittings: Use socket fusion.
		13. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.
	4. PIPING CONNECTIONS
		1. Make connections according to the following, unless otherwise indicated:
			1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
			2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
			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.
	5. EQUIPMENT INSTALLATION - COMMON REQUIREMENTS
		1. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
		2. Install equipment level and plumb, parallel, and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
		3. Install plumbing 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.
		4. Install equipment to allow right of way for piping installed at required slope.
	6. INSTALLATION - Plumbing IDENTIFICATION
		1. Install identifying devices after completion of coverings and painting.
		2. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
		3. Install tags using corrosion resistant chain. Number tags consecutively by location.
		4. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
		5. Identify plumbing equipment with plastic nameplates. Locate equipment labels where accessible and visible.
		6. Identify control panels and major control components outside panels with plastic nameplates.
		7. Identify valves in main and branch piping with tags.
		8. Identify piping, concealed or exposed, with plastic pipe markers and plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
		9. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
			1. Near each valve and control device.
			2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
			3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
			4. At access doors, manholes, and similar access points that permit view of concealed piping.
			5. Near major equipment items and other points of origination and termination.
			6. Spaced at maximum intervals of [50 feet] along each run. Reduce intervals to [25 feet] in areas of congested piping and equipment.
			7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
			8. Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.
	7. CONCRETE BASES
		1. 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 Section 033000 - Cast-in-Place Concrete.
	8. ERECTION OF METAL SUPPORTS AND ANCHORAGES
		1. Refer to Division 5 Section "Metal Fabrications" for structural steel.
		2. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.
		3. Field Welding: Comply with AWS D1.1.
	9. ERECTION OF WOOD SUPPORTS AND ANCHORAGES
		1. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.
		2. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
		3. Attach to substrates as required to support applied loads.
	10. GROUTING
		1. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.
		2. Clean surfaces that will come into contact with grout.
		3. Provide forms as required for placement of grout.
		4. Avoid air entrapment during placement of grout.
		5. Place grout, completely filling equipment bases.
		6. Place grout on concrete bases and provide smooth bearing surface for equipment.
		7. Place grout around anchors.
		8. Cure placed grout.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022