SECTION 221116

DOMESTIC WATER PIPING

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 2 Specification with primarily editable text; therefore, most of the text can be edited, but there is some required text which is noted within the Section with a “Note to Specifier.” Do not revise these paragraphs without an approved Deviation from USPS Headquarters, Facilities Program Management, through the USPS Project Manager.***

*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. Section Includes:
         1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
         2. Specialty valves.
         3. Flexible connectors.
         4. Water meters furnished by utility company for installation by Contractor.
         5. Escutcheons.
         6. Sleeves and sleeve seals.
      2. Related Section:
         1. Division 22 Section "Facility Water Distribution Piping" for water-service pipingand water meters outside the building from source to the point where water-service piping enters the building.
   2. PERFORMANCE REQUIREMENTS
      1. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7, where required by local codes/ordinance.
   3. SUBMITTALS
      1. Product Data: For each type of product indicated.
      2. Field quality-control reports.
   4. QUALITY ASSURANCE
      1. Piping materials shall bear label, stamp, or other markings of specified testing agency.
      2. Comply with NSF 14 for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.
      3. Comply with NSF 61 for potable domestic water piping and components.
2. PRODUCTS

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**NOTE TO SPECIFIER**

**REQUIRED**: Piping and fittings materials must comply with the chart in Section 220000 - Plumbing

Do not revise the materials below without an approved deviation; however, items may be removed to comply with local code requirements or for building requirements for MPF Repair & Alteration or Expansion projects; verify with the facility.

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PIPING MATERIALS

* + 1. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
  1. COPPER TUBE AND FITTINGS
     1. Hard Copper Tube: ASTM B88, Type L water tube, drawn temper.
        1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
        2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
        3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint ends.
     2. Soft Copper Tube: ASTM B88, Type K water tube, annealed temper.
        1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
  2. DUCTILE-IRON PIPE AND FITTINGS
     1. Push-on-Joint or Mechanical Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
        1. Standard-Pattern, Push-on-Joint Fittings: AWWA C110, ductile or gray iron.
           1. Gaskets: AWWA C111, rubber.
  3. PIPING JOINING MATERIALS
     1. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.
     2. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
     3. Solder Filler Metals: ASTM B 2, lead-free alloys. Include water-flushable flux according to ASTM B813.
     4. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
  4. SPECIALTY VALVES
     1. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
     2. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.
  5. TRANSITION FITTINGS
     1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
     2. Sleeve-Type Transition Coupling: AWWA C219.
  6. DIELECTRIC FITTINGS
     1. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
     2. Dielectric Unions:
        1. Description:
           1. Pressure Rating: 150 psig at 180 deg F.
           2. End Connections: Solder-joint copper alloy and threaded ferrous.
     3. Dielectric Flanges:
        1. Description:
           1. Factory-fabricated, bolted, companion-flange assembly.
           2. Pressure Rating: 150 psig.
           3. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
     4. Dielectric-Flange Kits:
        1. Description:
           1. Nonconducting materials for field assembly of companion flanges.
           2. Pressure Rating: 150 psig.
           3. Gasket: Neoprene or phenolic.
           4. Bolt Sleeves: Phenolic or polyethylene.
           5. Washers: Phenolic with steel backing washers.
     5. Dielectric Nipples:
        1. Description:
           1. Electroplated steel nipple complying with ASTM F1545.
           2. Pressure Rating: 300 psig at 225 deg F.
           3. End Connections: Male threaded or grooved.
           4. Lining: Inert and noncorrosive, propylene.
  7. FLEXIBLE CONNECTORS
     1. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
        1. Working-Pressure Rating: Minimum 200 psig.
        2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
        3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.
     2. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
        1. Working-Pressure Rating: Minimum 200 psig.
        2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
        3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.
  8. ESCUTCHEONS
     1. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
     2. One Piece, Cast Brass: Polished, chrome-plated finish with setscrews.
     3. Split Casting, Cast Brass: Polished, chrome-plated finish with concealed hinge and setscrew.
     4. G. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
     5. Split-Casting Floor Plates: Cast brass with concealed hinge.
  9. SLEEVES
     1. Cast-Iron Wall Pipes: Fabricated of cast iron, and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
     2. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
     3. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
     4. Galvanized-Steel-Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc-coated, with plain ends.
     5. 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 setscrews.
  10. SLEEVE SEALS
      1. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe and sleeve.
         1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
         2. Pressure Plates: Stainless steel.
         3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.
  11. GROUT
      1. Standard: ASTM C1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
      2. Characteristics: Nonshrink; recommended for interior and exterior applications.
      3. Design Mix: 5000-psi, 28-day compressive strength.
      4. Packaging: Premixed and factory packaged.

1. EXECUTION
   1. EARTHWORK
      1. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.
   2. PIPING INSTALLATION
      1. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
      2. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
      3. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
      4. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.
      5. Install shutoff valve immediately upstream of each dielectric fitting.
      6. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.
      7. Install domestic water piping level and plumb.
      8. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
      9. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
      10. 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.
      11. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
      12. Install piping adjacent to equipment and specialties to allow service and maintenance.
      13. Install piping to permit valve servicing.
      14. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
      15. Install piping free of sags and bends.
      16. Install fittings for changes in direction and branch connections.
      17. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
      18. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump.
      19. Install thermostats in hot-water circulation piping.
   3. JOINT CONSTRUCTION
      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 pipes, tubes, and fittings before assembly.
      3. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
      4. Soldered Joints: Apply ASTM B813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B828 or CDA's "Copper Tube Handbook."
      5. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
      6. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.
   4. VALVE INSTALLATION
      1. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.
      2. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.
      3. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 2 and smaller and butterfly valves for piping NPS 2-1/2 and larger. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves.
   5. TRANSITION FITTING INSTALLATION
      1. Install transition couplings at joints of dissimilar piping.
      2. Transition Fittings in Underground Domestic Water Piping:
         1. NPS 1-1/2 and Smaller: Fitting-type coupling.
         2. NPS 2 and Larger: Sleeve-type coupling.
      3. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller:
   6. DIELECTRIC FITTING INSTALLATION
      1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
      2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
      3. Dielectric Fittings for NPS 2-1/2 to NPS 64: Use dielectric flanges or flange kits.
   7. FLEXIBLE CONNECTOR INSTALLATION
      1. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.
      2. Install bronze-hose flexible connectors in copper domestic water tubing.
      3. Install stainless-steel-hose flexible connectors in steel domestic water piping.
   8. WATER METER INSTALLATION
      1. Install water meters according to AWWA M6, utility company's requirements, and the following:
      2. Install displacement-type water meters with shutoff valve on water-meter inlet. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.
      3. Install compound-type water meters with shutoff valves on water-meter inlet and outlet and on valved bypass around meter. Support meters, valves, and piping on brick or concrete piers.
      4. Install remote registration system according to standards of utility company and of authorities having jurisdiction.
   9. HANGER AND SUPPORT INSTALLATION
      1. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.
         1. Vertical Piping: MSS Type 8 or 42, clamps.
         2. Individual, Straight, Horizontal Piping Runs:
            1. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
            2. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
         3. Base of Vertical Piping: MSS Type 52, spring hangers.
      2. Support vertical piping and tubing at base and at each floor.
      3. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
      4. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
         1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
         2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
         3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
         4. NPS 2-1/2: 108 inches with 1/2-inch rod.
         5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
         6. NPS 6: 10 feet with 5/8-inch rod.
      5. Install supports for vertical copper tubing every 10 feet.
      6. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
         1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
         2. NPS 1-1/2: 108 inches with 3/8-inch rod.
         3. NPS 2: 10 feet with 3/8-inch rod.
         4. NPS 2-1/2: 11 feet with 1/2-inch rod.
         5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
         6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
         7. NPS 6: 12 feet with 3/4-inch rod.
      7. Install supports for vertical steel piping every 15 feet.
   10. CONNECTIONS
       1. Drawings indicate general arrangement of piping, fittings, and specialties.
       2. Install piping adjacent to equipment and machines to allow service and maintenance.
       3. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
       4. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
          1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
          2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
          3. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
          4. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.
   11. ESCUTCHEON INSTALLATION
       1. Install escutcheons for penetrations of walls, ceilings, and floors.
       2. Escutcheons for New Piping:
          1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
          2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, [cast brass with polished chrome-plated finish] [stamped steel with set screw] [stamped steel with set screw or spring clips] [stamped steel with spring clips].
          3. Bare Piping at Ceiling Penetrations in Finished Spaces: [One piece, cast brass with polished chrome-plated finish] [One piece or split casting, cast brass with polished chrome-plated finish] [Split casting, cast brass with polished chrome-plated finish] [One piece, stamped steel with set screw] [One piece or split plate, stamped steel with set screw] [Split plate, stamped steel with set screw].
          4. Bare Piping in Unfinished Service Spaces: One piece, [cast brass with polished chrome-plated finish] [cast brass with rough-brass finish] [stamped steel with set screw] [stamped steel with spring clips] [stamped steel with set screw or spring clips].
          5. Bare Piping in Equipment Rooms: One piece, [cast brass] [stamped steel with set screw] [stamped steel with spring clips] [stamped steel with set screw or spring clips].
          6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
       3. Escutcheons for Existing Piping:
          1. Chrome-Plated Piping: Split casting, cast brass with chrome-plated finish.
          2. Insulated Piping: Split plate, stamped steel with concealed hinge and spring clips.
          3. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish.
          4. Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish.
          5. Bare Piping in Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish.
          6. Bare Piping in Equipment Rooms: Split casting, cast brass.
          7. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.
   12. SLEEVE INSTALLATION
       1. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
       2. Sleeves are not required for core-drilled holes.
       3. Permanent sleeves are not required for holes formed by removable PE sleeves.
       4. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
       5. Install sleeves in new partitions, slabs, and walls as they are built.
       6. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
       7. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
       8. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals specified in this Section.
       9. Seal space outside of sleeves in concrete slabs and walls with grout.
       10. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
       11. Install sleeve materials according to the following applications:
           1. Sleeves for Piping Passing through Concrete Floor Slabs: Steel pipe.
           2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Stack sleeve fittings.
              1. Extend sleeves 2 inches above finished floor level.
              2. For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
           3. Sleeves for Piping Passing through Gypsum-Board Partitions:
              1. Steel pipe sleeves for pipes smaller than NPS 6.
              2. Galvanized-steel sheet sleeves for pipes NPS 6 and larger.
              3. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
           4. Sleeves for Piping Passing through Concrete Roof Slabs: Steel pipe.
           5. Sleeves for Piping Passing through Exterior Concrete Walls:
              1. Steel pipe sleeves for pipes smaller than NPS 6.
              2. Cast-iron wall pipe sleeves for pipes NPS 6 and larger.
              3. Install sleeves that are large enough to provide 1/2-inch annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.
       12. 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 in Division 7 Section "Penetration Firestopping" for firestop materials and installations.
   13. SLEEVE SEAL INSTALLATION
       1. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
       2. 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.
   14. IDENTIFICATION
       1. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.
       2. Label pressure piping with system operating pressure.
   15. FIELD QUALITY CONTROL
       1. Perform tests and inspections.
       2. Piping Inspections:
          1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
          2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
             1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
             2. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
          3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
          4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
       3. Piping Tests:
          1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
          2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
          3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
          4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
          5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
          6. Prepare reports for tests and for corrective action required.
       4. Domestic water piping will be considered defective if it does not pass tests and inspections.
       5. Prepare test and inspection reports.
   16. CLEANING
       1. Clean and disinfect potable domestic water piping as follows:
          1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
          2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
             1. Flush piping system with clean, potable water until dirty water does not appear at outlets.
             2. Fill and isolate system according to either of the following:

Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.

Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

* + - * 1. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
        2. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
    1. Prepare and submit reports of purging and disinfecting activities.
    2. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

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**NOTE TO SPECIFIER**

**REQUIRED**: Piping and fittings materials must comply with the chart in Section 220000 - Plumbing

Do not revise the materials below without an approved deviation; however, items may be removed to comply with local code requirements or for building requirements for MPF Repair & Alteration or Expansion projects; verify with the facility.

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* 1. PIPING SCHEDULE
     1. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
     2. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
     3. Under-building-slab, domestic water, building service piping, NPS 3 and smaller, shall be the following:
        1. Soft copper tube, ASTM B88, Type K; wrought-copper solder-joint fittings; and brazed joints.
     4. Under-building-slab, domestic water, building-service piping, NPS 4 to NPS 6, shall be the following:
        1. Push-on-join or mechanical joint, ductile-iron pipe; standard-pattern push-on-joint or mechanical fittings; and gasketed joints.
     5. Aboveground domestic water piping, NPS 2 and smaller, shall be the following:
        1. Hard copper tube, ASTM B88, Type L; wrought-copper solder-joint fittings; and soldered joints.
     6. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be the following:
        1. Hard copper tube, ASTM B88, Type L; wrought-copper solder-joint fittings; and soldered joints.
     7. Aboveground domestic water piping, NPS 5 and NPS 6, shall be the following:
        1. Hard copper tube, ASTM B88, Type L; wrought-copper solder-joint fittings; and soldered joints.
  2. VALVE SCHEDULE
     1. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
        1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 and larger.
        2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.
        3. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
        4. Drain Duty: Hose-end drain valves.
     2. Use check valves to maintain correct direction of domestic water flow to and from equipment.
     3. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022