SECTION 221316

SANITARY WASTE AND VENT 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. This Section includes the following soil and waste, sanitary drainage and vent piping inside the building:
         1. Pipe, tube, and fittings.
         2. Special pipe fittings.
   2. PERFORMANCE REQUIREMENTS
      1. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
         1. Soil, Waste, and Vent Piping: 10-foot head of water.
   3. SUBMITTALS
      1. Product Data: For each type of product indicated.
      2. Field quality-control inspection and test reports.
   4. QUALITY ASSURANCE
      1. Piping materials shall bear label, stamp, or other markings of specified testing agency.
      2. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; and "NSF-drain" for plastic drain piping.
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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* 1. PIPING MATERIALS
     1. Hub-and-Spigot, Cast-Iron Pipe and Fittings: ASTM A 74, Service class.
        1. Gaskets: ASTM C 564, rubber.
     2. Hubless Cast-Iron Pipe and Fittings: ASTM A 888 or CISPI 301.
        1. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.
        2. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
           1. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
           2. Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.
     3. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade A or B, Schedule 40, galvanized. Include ends matching joining method.
        1. Drainage Fittings: ASME B16.12, galvanized, threaded, cast-iron drainage pattern.
        2. Pressure Fittings:
           1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized, seamless steel pipe. Include ends matching joining method.
           2. Malleable-Iron Unions: ASME B16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
           3. Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.
           4. Cast-Iron Flanges: ASME B16.1, Class 125.
           5. Cast-Iron, Flanged Fittings: ASME B16.1, Class 125, galvanized.
     4. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
        1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought-copper, solder-joint fittings.
     5. Solid-Wall ABS Pipe: ASTM D 2661, Schedule 40, solid wall.
        1. ABS Socket Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste, and vent patterns.
        2. Solvent Cement and Adhesive Primer:
           1. Use ABS solvent cement that has a VOC content of 325 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
           2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
     6. Solid-Wall PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
        1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.
        2. Solvent Cement and Adhesive Primer:
           1. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
           2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. EXECUTION
   1. PIPING APPLICATIONS
      1. Special pipe fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.
      2. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
      3. Aboveground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
         1. Hubless cast-iron soil pipe and fittings and heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
         2. Copper DWV tube, copper drainage fittings, and soldered joints.
         3. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints. Not to be used in plenum spaces.
         4. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints. Not to be used in plenum spaces.
      4. Aboveground, soil, waste, and vent piping NPS 5 and larger shall be any of the following:
         1. Hubless cast-iron soil pipe and fittings and heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
         2. Copper DWV tube, copper drainage fittings, and soldered joints.
         3. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints.
         4. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
      5. Underground in building (to 5 feet outside building), soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
         1. Service class, hub-and-spigot, cast-iron soil pipe and fittings; gaskets; and compression joints.
      6. Underground in building (to 5 feet outside building), soil and waste Piping NPS 5 and larger shall be any of the following:
         1. Service class, cast-iron soil pipe and fittings; gaskets; and compression joints.
   2. PIPING INSTALLATION
      1. Sanitary sewer piping outside the building is specified in Division 22 Section "Facility Sanitary Sewers."
      2. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
      3. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
      4. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."
      5. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are specified in Division 22 Section "Common Work Results for Plumbing."
      6. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
      7. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
      8. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
      9. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
         1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
         2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
         3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
      10. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
      11. Install ABS soil and waste drainage and vent piping according to ASTM D 2661.
      12. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
      13. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
   3. JOINT CONSTRUCTION
      1. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."
      2. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
         1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
         2. Hubless Joints: Make with rubber gasket and sleeve or clamp.
      3. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
      4. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.
   4. VALVE INSTALLATION
      1. General-duty valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
      2. Shutoff Valves: Install shutoff valve on each sewage pump discharge.
         1. Use gate or full-port ball valve for piping NPS 2 and smaller.
         2. Use gate valve for piping NPS 2-1/2 and larger.
      3. Check Valves: Install swing check valve, downstream from shutoff valve, on each sewage pump discharge.
      4. Backwater Valves: Install backwater valves in piping subject to sewage backflow.
         1. Horizontal Piping: Horizontal backwater valves.[ Use normally closed type, unless otherwise indicated.]
         2. Floor Drains: Drain outlet backwater valves, unless drain has integral backwater valve.
         3. Install backwater valves in accessible locations.
         4. Backwater valves are specified in Division 22 Section "Sanitary Waste Piping Specialties."
   5. HANGER AND SUPPORT INSTALLATION
      1. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."
      2. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
         1. Vertical Piping: MSS Type 8 or Type 42, clamps.
         2. Individual, Straight, Horizontal Piping Runs: According to the following:
            1. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
            2. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
            3. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
         3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
         4. Base of Vertical Piping: MSS Type 52, spring hangers.
      3. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
      4. Support vertical piping and tubing at base and at each floor.
      5. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
      6. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
         1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
         2. NPS 3: 60 inches with 1/2-inch rod.
         3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
         4. NPS 6: 60 inches with 3/4-inch rod.
         5. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
      7. Install supports for vertical cast-iron soil piping every 15 feet.
      8. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
         1. NPS 1-1/4: 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: 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.
      9. Install supports for vertical steel piping every 15 feet.
      10. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
          1. NPS 1-1/4: 72 inches with 3/8-inch rod.
          2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
          3. NPS 2-1/2: 108 inches with 1/2-inch rod.
          4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
          5. NPS 6: 10 feet with 5/8-inch rod.
      11. Install supports for vertical copper tubing every 10 feet.
      12. Install hangers for ABS and PVC piping with the following maximum horizontal spacing and minimum rod diameters:
          1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
          2. NPS 3: 48 inches with 1/2-inch rod.
          3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
          4. NPS 6: 48 inches with 3/4-inch rod.
      13. Install supports for vertical ABS and PVC piping every 48 inches.
      14. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.
   6. CONNECTIONS
      1. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
      2. Connect drainage and vent piping to the following:
         1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
         2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
         3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
         4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.
   7. FIELD QUALITY CONTROL
      1. During installation, notify authorities having jurisdiction at least 24 hours 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 for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
      2. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
      3. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
      4. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.
         1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
         2. Prepare reports for tests and required corrective action.
   8. CLEANING
      1. Clean interior of piping. Remove dirt and debris as work progresses.
      2. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
      3. Place plugs in ends of uncompleted piping at end of day and when work stops.
   9. PROTECTION
      1. Exposed ABS and PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022