SECTION 22 1316 - SANITARY WASTE AND VENT PIPING

ALL LIBRARIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following for soil, waste, vent and sub soil drainage piping inside the building and indicated on plans to a point 5’-0” beyond exterior wall or as noted on plans.

1. Pipe, tube, and fittings.
2. Special pipe fittings.
3. Encasement for underground metal piping.
4. Indirect waste pipe and fittings

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

C. LLDPE: Linear, low-density polyethylene plastic.

D. NBR: Acrylonitrile-butadiene rubber.

E. PE: Polyethylene plastic.

F. PVC: Polyvinyl chloride plastic.

G. TPE: Thermoplastic elastomer.

1.4 PERFORMANCE REQUIREMENTS

A. 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.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to Division 22 Section 22 048 "Seismic Protection."

1.5 SUBMITTALS

A. Product Data: For pipe, tube, fittings and specialty fittings, couplings, primer and solvent.

B. Shop Drawings:

1. Design Calculations: Signed and sealed by a qualified professional engineer for selecting seismic restraints.

C. Field quality-control inspection and test reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. All cast iron pipe and fittings shall be manufactured in the **U.S.A.** and marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and listed by NSF International. All cast-iron pipe and fittings shall be by the same manufacturer.

C. All PVC DWV pipe and fittings shall be solid-core and manufactured from virgin rigid (polyvinyl chloride) vinyl compounds with a cell class of 12454 as identified in ASTM D1784, ASTM D 2665 and shall be manufactured as a system and be the product of one manufacturer. All PVC-DWV pipe and fitting shall be manufactured in the **U.S.A** conforming to NSF standard 14. All PVC-DWV pipe and fittings shall be by the same manufacturer.

D. Foreign manufactured or imported pipe or fittings will **not** be allowed.

E. PVC DWV pipe and fittings **shall not** be installed in return air plenum space. Refer to HVAC plans for return air plenum space. Contact engineer, in writing, if unclear where return air plenums are located. This Contractor shall submit scaled plans, to the Engineer prior to fabrication or installation, for review indicating his understanding of return air plenum spaces

1.7 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect and Construction Manager no fewer than five days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Architect's and Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

a. Charlotte Pipe and Foundry.
b. AB&I Foundry.
c. Tyler Pipe.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS (Interior Below Slab and/or **Only** where indicated on plans)

A. Pipe and Fittings: ASTM A 74, Service class.

B. Gaskets: ASTM C 564, rubber.

2.4 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS (Interior above slab and only in return air plenums.) **Note: Hubless cast-iron pipe and fittings <u>will not</u> be allowed under slab**.

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Shielded Couplings: ASTM C 1277 and ASTM C 1540 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop, UPC emblem

1. Heavy-Duty, Shielded, 304 Stainless Steel Couplings: With 304 corrugated stainless-steel shield, stainless-steel bands and slotted tightening devices, and ASTM C 564, rubber sleeve.

a. Manufacturers:

1) ANACO.
2) Ideal Div.; Stant Corp.
3) Mission Rubber Co.
4) Tyler Pipe; Soil Pipe Div.

2. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with 304 stainless-steel corrugated shield; 304 stainless-steel bands and slotted tightening devices; and ASTM C 564, rubber sleeve & bear the NSF Trademark.

a. Manufacturers:

1) ANACO
2) Mission Rubber Co.
3) Tyler Pipe: Soil Pipe Div.

2.5 COPPER TUBE AND FITTINGS (INDIRECT WASTE ONLY)Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.

C. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

D. Hard Copper Tube: ASTM B 88, Type K and Type L (ASTM B 88M, Type B and Type C), water tube, drawn temper.

E. Copper Pressure Fittings:

1. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

F. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.

1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

G. Solder: ASTM B 32, lead-free with ASTM B 813, water-flushable flux.

2.6 SUB SOIL DRAINAGE PIPE AND FITTINGS

A. Schedule 40 DWV PVC, solid wall, ASTM A2665. 4 or 6 inch diameter as noted on plans.

B. PVC socket fittings: ASTM D2665 made to ASTM D3311, drain patterns.

C. 2 rows of 5/8” diameter holes, 8” on center at 120° apart the entire length of pipe. Do not drill holes in fittings, couplings or cleanout risers.

2.5 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Shielded, Non-pressure Transition Couplings:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Fernco Inc.
      2) Cascade Waterworks Mfg. Co.
      3) Mission Rubber Company; a division of MCP Industries, Inc.
   b. Standard: ASTM C 1460
   c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

B. Aboveground, **soil, waste and vent** piping NPS 2 and smaller shall be the following:

1. Hubless cast-iron soil pipe and fittings; standard shielded, stainless-steel couplings; and hubless-coupling joints.

C. Aboveground, **soil and waste** piping NPS 3 and larger shall be the following:

1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.

D. Aboveground, **vent** piping NPS 4 and smaller shall be the following:

1. Hubless cast-iron soil pipe and fittings; standard shielded, stainless-steel couplings; and hubless-coupling joints.

E. Underground, soil, waste, and vent piping NPS 2 and larger shall be the following:

1. Service class, hub and spigot cast-iron soil piping; gaskets; and gasketed joints.
2. No-hub cast-iron **will not** be acceptable for below slab installation.

F. Aboveground sanitary-sewage force mains NPS 1-1/2 to NPS 6 shall be the following:

1. Steel pipe, pressure fittings, and threaded joints.

G. Underground sanitary-sewage force mains NPS 4 and smaller shall be any of the following:

1. Steel pipe, pressure fittings, and threaded joints.

   a. Include grooved-joint system fittings and couplings and grooved joints where indicated.

2. Mechanical-joint, ductile-iron pipe; mechanical-joint, ductile-iron fittings; glands, gaskets, and bolts; and mechanical joints.

   a. Include grooved-joint system fittings and couplings and grooved joints where indicated.

3. Pressure pipe couplings, if dissimilar pipe materials or piping with small difference in OD must be joined.

H. Indirect waste pipe and fittings shall be the following:

1. Copper DWV drainage tube with solder-joint fittings.

3.3 PIPING INSTALLATION

A. Basic piping installation requirements are specified in Division 22 Section "Common Work

Results for Plumbing."

B. Install seismic restraints on piping. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

F. 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."

G. Install wall-penetration fitting at each service pipe penetration through foundation wall. Make installation watertight.

H. 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."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.

I. 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.

J. 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.

K. 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. Vent Piping: 1/2 percent down toward vertical fixture vent or toward vent stack.

L. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

M. Do not enclose, cover, or put piping into operation until it is inspected and approved in writing by authorities having jurisdiction.

3.4 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

C. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

D. Grooved Joints: Assemble joint with keyed coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

E. Solvent Joints: PVC DWV shall be made with purple primer and medium body, medium set solvent per ASTM F 656.

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.
3. Remove all burrs and bevel ends prior to joining.

3.5 VALVE INSTALLATION

A. General valve installation requirements are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves: Install shutoff valve on each sewage pump discharge.

1. Install full-port ball valves for piping NPS 2 and smaller.
2. Install butterfly valves for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

D. 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. Install backwater valves in accessible locations.
3. Backwater valve are specified in Division 22 Section "Sanitary Waste Piping Specialties."

3.6 HANGER AND SUPPORT INSTALLATION

A. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. 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. Install individual, straight, horizontal piping runs according to the following:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer than 100 Feet MSS Type 43, adjustable roller hangers.
    c. 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.

C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

F. 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. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for 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 to NPS 8: 48 inches with 3/4-inch rod.
5. NPS 10 to NPS 12: 48 inches with 7/8-inch rod.

I. Install supports for vertical PVC piping every 48 inches unless noted otherwise.

J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
2. 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.

3.8 FIELD QUALITY CONTROL

A. 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.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. 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 separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Hydrostatically test PVC-DWV system. **Do Not** use gas or compressed air. Plug or cap all openings of area to be tested, slowly fill system with water, to allow trapped air to escape, to a point of overflow but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect all joints for leaks. Repair leaks and retest. Continue until system test passes.
6. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
7. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. 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.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.9 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

END OF SECTION 22 1316