

SECTION 22 11 10 - DOMESTIC WATER PIPING

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 domestic water piping for underground, under slab and above ground installations including accessories.

1.3 SUBMITTALS

- A. Product Data: For the following products:
 - 1. Specialty valves.
 - 2. Piping materials.
- B. Coordination Drawings: Piping layout, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.
- C. System purging and disinfecting activities report.

1.4 QUALITY ASSURANCE

- A. The installation shall comply with the requirements of the International Plumbing Code (IPC) and any applicable local code amendments. Verify the code with requirements with the local code official(s) before beginning the work.
- B. All domestic water piping and fittings are required to bear the identification of the manufacturer as required in Chapter 3; paragraph 303.1 of the IPC.
- C. Comply with NSF 61 for potable domestic water piping and components.

1.5 PROJECT CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt service to any portion of the existing occupied facilities until receiving permission. If interruption of the existing service is required, coordinate the work with the Owner and, if necessary, perform the work at a time, other than normal working hours, which is suitable to the owner.

1.6 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. 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.

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
 - 1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- B. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) water tube, annealed temper.
 - 1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- C. Grooved Joint Copper Piping Systems: Provide grooved copper products manufactured by Victaulic. All grooved copper system components are to be supplied by the same manufacturer.
 - 1. Copper Tube: ASTM B 88, Type L roll grooved in accordance with the manufacturer's standards and copper tube dimensions.
 - 2. Couplings for grooved piping to consist of ductile iron cast housings with synthetic rubber gasket of a pressure responsive design with plated nuts and bolts to secure the unit. Couplings shall be manufactured to connect to copper tubing and fittings without flaring.
 - a. Coupling housings: ductile iron (ASTM A-536, grade 65-45-12) coated with copper colored alkyd enamel.
 - b. Coupling Gaskets: gasket to be Grade EHP EPDM compound with red color code design for operating temperatures from minus 30 degrees F to plus 250 degrees F.
 - c. Victaulic Style 607 installation ready coupling for direct stab installation with filed disassembly.
 - 3. Fittings: manufactured to copper tube sizes with grooves designed to accept grooved couplings. Fittings shall be wrought copper conforming to ASTM B-75 alloy C12200 or ASTM B-152 alloy C11000 and ANSI B16.22.
- D. Press-Fit Joint Copper Piping Systems: Provide Press-fit copper pipe products manufactured by Viega, Elkhart Products or NIBCO, Inc.
 - 1. Hard Copper Tube: ASTM B88.
 - 2. Copper fittings: ASME B16.18, ASME B16.22 or ASME B16.26.
 - 3. Press Fitting: Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press ends shall have SC (Smart Connect™) feature design (leakage path). In ProPress ½" to 4" dimensions the Smart Connect Feature assures leakage of liquids and/or gases from inside the system past the sealing element of an unpressed connection. The function of this feature is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.

2.3 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 - 1. Standard-Pattern, Mechanical-Joint Fittings: AWWA C110, ductile or gray iron.
 - 2. Compact-Pattern, Mechanical-Joint Fittings: AWWA C153, ductile iron.
 - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.4 PIPING JOINING MATERIALS

- A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

2.5 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hyspan Precision Products, Inc.
 - 2. Metraflex, Inc.
 - 3. Universal Metal Hose; a Hyspan company.
- B. 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 (1380 kPa).
 - 2. End Connections NPS 2 (DN 50) and Smaller: Threaded copper pipe or plain-end copper tube.
 - 3. End Connections NPS 2-1/2 (DN 65) and Larger: Flanged copper alloy.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. 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.
- B. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
- C. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- D. Install underground copper tube in PE encasement according to ASTM A 674 or AWWA C105.
- E. Install shutoff valve, drain valve, pressure gage, inside the building at each domestic water service entrance.
- F. Install shutoff valve immediately upstream of each dielectric fitting.

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- G. When required, rough-in domestic water piping for water-meter installation according to utility company's requirements.
- H. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas. Install exposed piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- I. Install piping adjacent to equipment and specialties to allow service and maintenance. Install piping to permit valve servicing.
- J. 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.
- K. Install piping free of sags and bends.
- L. Install fittings for changes in direction and branch connections.
- M. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- N. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump.
- O. Install thermometers on inlet and outlet piping from each water heater.

3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- B. 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.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- C. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- D. Joint Construction for Grooved-End Copper Tubing: Make joints according to the manufacturer's instructions and AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.
- E. Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
- F. 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.
- G. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 VALVE INSTALLATION

- A. 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 valves for piping NPS 3 and smaller. Use butterfly valves for piping NPS 3 and larger.
- B. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."
 - 1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
 - 2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.
- C. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow.

3.4 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.5 FLEXIBLE CONNECTOR INSTALLATION

- A. 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.

3.6 WATER METER INSTALLATION

- A. Where required, rough-in domestic water piping for water meter installation, and install water meters according to utility company's requirements. Install water meters according to AWWA M6, utility company's requirements.

3.7 PIPE HANGER AND SUPPORT INSTALLATION

- A. Support all domestic water piping in accordance with the International Plumbing Code or local code requirements.
- B. Hangers shall be of materials that will not support galvanic action. Support piping with adjustable clevis hangers for all horizontal piping. Provide a 12" long 18 gage protective saddle for all clevis hangers that support insulated piping. Support each system independently of other piping systems, allowing for expansion of the pipe.
- C. Install hangers for copper tubing with the following spacing:
 - 1. NPS 1-1/4" and smaller: 6 feet maximum horizontal.
 - 2. NPS 1-1/2" and larger: 10 feet maximum horizontal.
 - 3. Install supports for vertical pipe at a maximum spacing of 10 feet.

3.8 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties. Install piping adjacent to equipment and machines to allow service and maintenance.
- B. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- C. 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 (DN 65) and larger.

3.9 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors.

3.10 SLEEVE INSTALLATION

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls. Sleeves are not required for core-drilled holes.
- B. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated. Install sleeves in new partitions, slabs, and walls as they are built.
- C. 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. Provide fireproofing where required.
- D. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using wall penetration systems.
- E. 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: Steel pipe. Extend sleeves 2 inches above finished floor level.
 - 3. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - a. Galvanized-steel sheet sleeves for pipes NPS 6 (DN 150) and larger. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
- F. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations.

3.11 IDENTIFICATION

- A. Identify system components. Comply with requirements indicated in Specification Section 220553.

3.12 FIELD QUALITY CONTROL

- A. Test systems according to procedures of authorities having jurisdiction or, in absence of such procedures, testing shall be per the requirements on the International Plumbing Code Section 312, Test and Inspections.
- B. Piping Inspections: coordinate all inspection requirements with the Authorities Having Jurisdiction. Do not enclose, cover, or put piping into operation until it has been inspected and approved.
- C. Domestic water piping will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.13 ADJUSTING

- A. Perform the following adjustments before operation:
 - 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Open shutoff valves to fully open position.
 - 3. Open throttling valves to proper setting.
 - 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
 - 5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
 - 6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 - 7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
 - 8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.14 DISINFECTION OF POTABLE WATER SYSTEM(S)

- A. All domestic water piping shall be purged and disinfected prior to utilization. The method to be followed shall be that required by the International Plumbing Code, Section 610, or the requirements of the local authorities.
- B. Prepare and submit reports of purging and disinfecting activities.

3.15 PIPING SCHEDULE

- A. Under-building-slab, domestic water, building service piping, NPS 3 (DN 80) and smaller, shall be the following:
 - 1. Soft copper tube, ASTM B 88, Type L (ASTM B 88M, Type B)]; wrought-copper solder-joint fittings; and brazed or copper pressure-seal fittings and joints.

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- B. Under-building-slab, domestic water, building-service piping, NPS 4 to NPS 8 (DN 100 to DN 200) shall be the following:
 - 1. Mechanical-joint, ductile-iron pipe; mechanical-joint fittings; and mechanical restrained joints.
- C. Aboveground domestic water piping, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B) copper solder-joint fittings; and soldered, press-fit or grooved joints.

3.16 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use ball valves for piping NPS 2 (DN 50) and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
 - 2. Throttling Duty: Use ball valves for piping NPS 2 (DN 50) and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
 - 3. Hot-Water Circulation Piping, Balancing Duty: Calibrated balancing valves.
 - 4. Drain Duty: Hose-end drain valves.
- B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 22 11 10