

SECTION 22 1118 - DOMESTIC WATER DISTRIBUTION SYSTEM

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. Section Includes:

1. Under-building slab supply, and aboveground domestic water supply and recirculation pipes, tubes, fittings, and certain specialties inside the building from 1'-0" above finished floor or 1'-0" inside the exterior wall as shown on the drawings, and as coordinated with the related work of Division 33.
2. Flexible connectors.
3. Piping encasement.
4. Water meters.
5. Application of valves.

B. Related Sections:

1. Division 33 Section "Facility Water Distribution Piping" for water-service piping outside the building from the source to a point 1'-0" above finished floor or 1'-0" inside the exterior wall of the building as shown on the drawings.
2. Division 22 0523 "General Duty Valves for Plumbing Piping"
3. Section 22 0000 "Common Work Results of Plumbing."
4. Section 22 2114 "Plumbing Specialties."
5. Section 22 4000 "Plumbing Fixtures."
6. Section 22 4500 "Plumbing Equipment."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

B. [LEED Submittal:

1. **Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content.]**

- C. Field quality-control reports.

1.4 INFORMATIONAL SUBMITTALS

- A. For any systems requiring State code pre-approval, provide letters from the State for same.

- B. Documentation that proposed products meet California Health and Safety Code 116875 (AB 1953) - 2010, for 25% low lead content of piping, pipe fittings, and faucets for water intended for human consumption.
- C. Water tests: After system completion, provide water tests for proof of compliance with the Authority Having Jurisdiction.
- D. At closeout, Northwestern University Maintenance Requirement Forms, see Division 01 for more information.

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with California Health and Safety Code 116875 (AB 1953) - 2010, for 25% low lead content of piping, pipe fittings, and faucets for water intended for human consumption, and NSF/ANSI Standard 61, including Annex G-2010 - Drinking Water System Components - Low Lead Content Requirement.
- C. To assure uniformity and compatibility of piping components in grooved end piping systems, all grooved products utilized shall be supplied by the same manufacturer.
- D. All grooved couplings shall be installed strictly according to grooved manufacturer's instructions including torque verification and specific lubrication as published.
- E. Flexible connectors shall be installed according to the manufacturer's instructions, with any adjacent special pipe support/guiding required.
- F. Comply with FM Global requirements for cross connections, and for any pressure reducing valves for fire protection service.

1.6 SPECIAL WARRANTIES

- A. Five (5) years, see Division 01 for more information.

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. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
 - 2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
 - 3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
5. Grooved-End Copper Fittings: ASTM B 75 copper tube, or ASTM B 152 wrought copper, with copper tubing sized grooved ends designed to accept grooved couplings. Flaring of tube and fitting ends to IPS dimensions is not permitted.
6. Grooved-End-Tube Couplings: Rigid pattern, unless otherwise indicated; gasketed fitting. Ductile- iron housing with keys matching pipe and fitting grooves: 2" through 8": Installation ready rigid coupling with Grade EHP/EPDM gaskets (unless noted otherwise herein) rated for maximum 250 deg F for use with housing, and steel bolts and nuts. Victaulic Style 607.
7. Grooved-End-Tube Mechanical Tube Fittings: Copper-tube dimensions and design similar to AWWA C606. Bronze upper housing and copper-colored enamel coated ductile iron lower housing, threaded outlet and locating collar, EPDM synthetic rubber gasket suit able for hot and cold water, and bolts and nuts. Victaulic Style 622.
8. Soldering of piping and fittings greater than 2" is not allowed. These joints and connections must be brazed or grooved.

2.3 DUCTILE-IRON PIPE AND FITTINGS (For 3" and Larger Pipe Sizes)

A. Mechanical-Joint, Ductile-Iron Pipe:

1. AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Standard-Pattern, Mechanical-Joint Fittings:

1. AWWA C110/A21.10, ductile or gray iron.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

C. Compact-Pattern, Mechanical-Joint Fittings:

1. AWWA C153/A21.53, ductile iron.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

D. Plain-End, Ductile-Iron Pipe: AWWA C151/A21.51.

2.4 PIPING JOINING MATERIALS

- A. 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.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813. Shall be Lead free NSF/ANSI 61 compliant.
- D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated. Shall be Lead free NSF/ANSI 61 compliant.

- E. Flux: ASTM B 813, water flushable.
- F. Pipe Thread Tape: Food grade commercial duty pipe thread sealant tape only.

2.5 TRANSITION FITTINGS

- A. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- B. Sleeve-Type Transition Coupling: AWWA C219.

2.6 DIELECTRIC FITTINGS

- A. 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.
- B. Dielectric Flanges:
 - 1. Description:
 - a. Factory-fabricated, bolted, companion-flange assembly.
 - b. Pressure Rating: 150 psig.
 - c. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- C. Dielectric-Flange Kits:
 - 1. Description:
 - a. Nonconducting materials for field assembly of companion flanges.
 - b. Pressure Rating: 150 psig.
 - c. Gasket: Neoprene or phenolic.
 - d. Bolt Sleeves: Phenolic or polyethylene.
 - e. Washers: Phenolic with steel backing washers.
- D. Dielectric Couplings:
 - 1. Description:
 - a. Galvanized-steel coupling.
 - b. Pressure Rating: 300 psig at 225 deg F.
 - c. End Connections: Female threaded.
 - d. Lining: Inert and noncorrosive, thermoplastic.
- E. Dielectric Nipples:
 - 1. Description:
 - a. Electroplated steel nipple complying with ASTM F 1545.
 - b. Pressure Rating: 300 psig at 225 deg F.
 - c. End Connections: Male threaded or grooved.
 - d. Lining: Inert and noncorrosive, propylene.

2.7 FLEXIBLE CONNECTORS

- A. 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.
- B. 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 (1380 kPa).
 - 2. End Connections NPS 2 (DN 50) and Smaller: Threaded stainless steel pipe nipple.
 - 3. End Connections NPS 2-1/2 (DN 65) and Larger: Flanged stainless steel pipe nipple.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Flex-Hose.
 - 2. Flexicraft.
 - 3. Hyspan.
 - 4. Flex Precision.

2.8 ENCASEMENT FOR PIPING

- A. Standard: ASTM A 674 or AWWA C105/A21.5.
- B. Form: **[Sheet] [or] [tube]**.
- C. Color: **[Black] [or] [natural] <Insert color>**.

2.9 WATER METERS

- A. Water meter type to be as indicated on the drawings, and they must meet University and local water purveyor requirements.
- B. Positive Displacement Meters
 - 1. Positive displacement meters shall be provided with an auxiliary relay to be connected to the building automation system.
- C. **Remote Registration System: Direct-reading type complying with AWWA C706; modified with signal transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company, and by University.**

PART 3 - EXECUTION

3.1 EARTHWORK

- A. ***Comply with requirements in Division 31 2000 Section "Earth Moving" for excavating, trenching, and backfilling.***

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping and related components. 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 copper tubing under building slab according to CDA's "Copper Tube Handbook" and no joints allowed under slabs.
- C. The maximum developed length of 1/2" diameter piping shall be 10'.
- D. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
- E. Install underground [**copper tube**] [**and**] [**ductile-iron pipe**] in PE encasement according to ASTM A 674 or AWWA C105/A21.5.
- F. No joints or fittings in lines below floors after the facility water entry assembly.
- G. 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 "Plumbing Specialties" for drain valves and strainers.
- H. Install shutoff valve immediately upstream of each dielectric fitting.
- I. Install domestic water piping level and plumb.
- J. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- K. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- L. 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.
- M. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- N. Install piping adjacent to equipment and specialties to allow service and maintenance.
- O. Install piping to permit valve servicing.

- P. 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.
- Q. Install piping free of sags and bends.
- R. Install fittings for changes in direction and branch connections.
- S. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- T. Provide proper access to components and work that require inspection, repair, service, or maintenance.
- U. No piping or mechanical equipment with a fluid shall be routed over electrical busway housings or spaces sensitive to water damage.
- V. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages.
- W. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers.
- X. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Common Work Results for Plumbing."
- Y. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Common Work Results for Plumbing."
- Z. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Common Work Results for
- AA. When a two-inch diameter or greater water service enters a building, install two backflow preventers side by side. Provide full-service size backflow preventers and install them so that one may be shut off without interrupting the flow of domestic water to the building.
- BB. Install piping so that there is a minimal amount of stagnant water conditions. Route branch lines for showers and safety equipment so that water is constantly circulating.
- CC. Install ball valves, balancing valves, check valves, etc. in the direction of the water flow.

3.3 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. 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.
- D. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Braze Joints" Chapter. Shall be Lead free NSF/ANSI 61 compliant.
- E. 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." Shall be Lead free NSF/ANSI 61 compliant.
- F. Joint Construction for Grooved-End Copper Tubing: Make joints according to 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.
- G. Joint Construction for Grooved-End, Ductile-Iron Piping: Make radius cut joints according to AWWA C606. Cut round-bottom grooves in ends of pipe at gasket-seat dimension required for specified (flexible or rigid) joint. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.
- H. 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.
- I. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.
- J. Grooved Joints for Copper Piping: Roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Grooved end shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. A representative shall provide on-site training for contractor's field personnel. Contractor shall remove and replace any improperly installed products.

3.4 VALVE INSTALLATION

- A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations. Shall be Lead free NSF/ANSI 61 compliant.
- B. 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 2 and smaller. Use OS&Y or NRS gate valves for piping NPS 2-1/2 and larger.
- C. 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.

- D. 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.
- E. For isolation valves at water heaters, install valves that relieve heater pressure when closed.
- F. Provide full port valves. Butterfly valves are not allowed.

3.5 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition [fittings] [or] [unions].
- C. 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.

3.6 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing. Shall be Lead free NSF/ANSI 61 compliant.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings or nipples.
- C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.
- D. Dielectric Fittings for NPS 5 to NPS 6: Use dielectric flange kits.

3.7 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.
- B. Install bronze-hose flexible connectors in copper domestic water tubing.
- C. Install stainless-steel-hose flexible connectors in non-copper domestic water piping.

3.8 WATER METER INSTALLATION

- A. Rough-in domestic water piping, and install water meter as indicated on the drawings according to AWWA M6 and the utility company's requirements.
- B. Install water meters with shutoff valves on water-meter inlet and outlet. Provide a valved bypass around meter only if required by the utility company. Support meters, valves, and piping on brick or concrete piers.

- C. *Install remote registration system according to standards of University, utility company, and of authorities having jurisdiction.***

3.9 HANGER AND SUPPORT INSTALLATION

- A. 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:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 3. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Support vertical piping and tubing at base and at each floor.
- C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- D. 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.
- E. Install supports for vertical copper tubing every 10 feet.
- F. Install hangers for ductile iron piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 3: 12 feet with 1/2-inch rod.
 2. NPS 4: 12 feet with 5/8-inch rod.
 3. NPS 6: 12 feet with 3/4-inch rod.
 4. NPS 8 and Larger: 12 feet with 3/4-inch rod.
- G. Install supports for vertical ductile iron piping every 15 feet.

3.10 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to water-service piping at a point 1'-0" above finished floor or 1'-0" inside the exterior wall, as shown on the drawings, with a shutoff valve using a transition fitting to join dissimilar piping materials then extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. 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.
3. 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.

3.11 IDENTIFICATION

- A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.
- B. Label pressure piping with system operating pressure.

3.12 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Piping Inspections:
 1. Schedule inspections with FMO periodically to correspond to completion of floors or zones or areas to allow timely review.
 2. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction, FMDC and FMO.
 3. 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:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 4. Re-inspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for re-inspection.
 5. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- C. Piping Tests:
 1. Fill domestic. 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, minimum of 100 psi, 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.
7. Following approved testing, thoroughly flush water systems to ensure piping is free of debris and contaminants.

D. Domestic piping will be considered defective if it does not pass tests and inspections.

E. 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 hot-water flow 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 CLEANING

A. Clean and disinfect potable domestic water piping as follows (and in accordance with local code and jurisdiction):

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:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) 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.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

- d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.15 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Under-building-slab, domestic water piping, NPS 2 1/2 and smaller, shall be the following:
 1. Soft copper tube, ASTM B 88, Type K; no joints allowed under floor slabs.
- D. Under-building-slab, domestic water piping, NPS 3 and larger, shall be the following:
 1. Ductile Iron; with ductile iron fittings, and mechanical joints.
- E. Aboveground domestic water piping, NPS 2 and smaller, shall be the following:
 1. Hard copper tube, ASTM B 88, Type L; cast or wrought copper solder-joint fittings; and soldered joints. Shall be Lead Free NSF/ANSI 61 compliant.
- F. Aboveground domestic water piping, NPS 2 1/2, shall be one of the following:
 1. Hard copper tube, ASTM B 88, Type L; cast or wrought copper braze joint fittings; and brazed joints. Shall be Lead Free NSF/ANSI 61 compliant.
 2. Hard copper tube, ASTM B 88, Type L; grooved, with matching fittings; and roll grooved joints. Shall be Lead Free NSF/ANSI 61 compliant.
- G. Aboveground domestic water piping, NPS 3 and 4, shall be one of the following:
 1. Hard copper tube, ASTM B 88, Type L; cast or wrought copper braze-joint fittings; and brazed joints. Shall be Lead Free NSF/ANSI 61 compliant.
 2. Hard copper tube, ASTM B 88, Type L; grooved, with matching fittings; and roll grooved joints. Shall be Lead Free NSF/ANSI 61 compliant.
- H. Aboveground domestic water piping, NPS 6 and Larger, shall be the following:
 1. Hard copper tube, ASTM B 88, Type L; cast or wrought copper braze-joint fittings; and brazed joints. Shall be Lead Free NSF/ANSI 61 compliant.
 2. Hard copper tube, ASTM B 88, Type L; grooved, with matching fittings; and roll grooved joints. Shall be Lead Free NSF/ANSI 61 compliant.

3.16 VALVE SCHEDULE (Including Access to Same)

- 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 and smaller. Use OS&Y or NRS gate valves or ball valves with flanged ends for piping NPS 2-1/2 and larger (ball valves only to 3"). Shall be Lead Free NSF/ANSI 61 compliant.
 2. Throttling Duty: Use gate valves for piping NPS 2 and smaller. Shall be Lead Free NSF/ANSI 61 compliant.
 3. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
 4. Drain Duty: Hose-end drain valves. Shall be Lead Free NSF/ANSI 61 compliant.
 5. Faucets and fixtures, such as emergency showers, eyewashes, dishwashers, and autoclaves, shall have local shutoff valves within 5' of the faucet/fixture. Valves must be readily accessible. Shall be Lead Free NSF/ANSI 61 compliant.
 6. Shut-off isolation valves shall be provided on every branch line no more than 18" off of the main lines or risers. Additional shut-off isolation valves may be needed further down the branch lines also, and are to be provided to the satisfaction of the University. Shall be Lead Free NSF/ANSI 61 compliant.
 7. Locate shut off valves outside or directly inside every space that requires water for research. Locate shut off valves for restricted access spaces immediately outside the space.
 8. Provide shut off valves for each space to allow water shut off in that space without interrupting water service to any other space.
 9. When a water line is fed from a floor above or below, provide an accessible shutoff valve on both floors. The supply stop for a fixture is not considered a shut off valve.
- B. Iron grooved-end valves may be used with grooved-end piping. Shall be Lead Free NSF/ANSI 61 compliant. Install grooved valves that are full port or greater than the size of the piping in which it is installed.
- C. Access panels shall be provided for any plumbing valves that may be in walls or in-accessible ceilings. Access panels shall be a minimum of 12" x 12".
- D. For valves located behind an access panel, locate the valve within twelve inches (1'-0") of the opening of the access panel.
- E. Locate all shutoff valves so that they are accessible from a standard A-frame ladder. This includes valves above ceiling access panels, or any ceiling finish material. Use of an extension ladder or lift is not acceptable. Exceptions must be approved in advance by NU Facilities Management.

END OF SECTION 22 1118