PART 1 - GENERAL

1.1 SUMMARY

A. Section includes domestic water piping, valves, fittings, hangers, pumps, controls, and accessories.

B. Related Sections:
   1. Section 15100 – Building Services Piping.
   2. Section 03100 – Concrete Forms and Accessories: Execution requirements for placement of inserts and sleeves specified by this section.
   3. Section 03300 – Cast-in-Place Concrete: Execution requirements for placement of concrete housekeeping pads specified by this section.
   4. Section 09900 – Paints and Coatings: Execution requirements for painting material specified by this section.
   5. Section 15070 – Mechanical Sound, Vibration, and Seismic Control: Product requirements for vibration isolators for placement by this section.
   6. Section 15080 – Mechanical Identification: Product requirements for pipe identification and valve tags for placement by this section.
   7. Section 15142 – Backflow Preventers (Reduced Pressure)
   8. Section 15143 – Backflow Preventers (Double Check Valves)
   9. Section 16150 – Wiring Devices: Execution requirements for electric connections to equipment specified by this section.
   10. Section 16225 - Motors: Product requirements for motors for placement by this section.

1.2 WARRANTY

A. Furnish five-year manufacturer warranty for domestic water piping.

1.3 PROHIBITIONS

A. Use of mechanical couplings is not allowed except on lab acid waste pipe.

B. Type M copper tubing is not allowed.

C. Schedule 10 steel piping is not allowed.

D. Connections for non-potable chemical treatment are not allowed on potable side of backflow preventers.

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1 Listing of related sections is for convenience and is not all-inclusive. Affected sections or drawings where specific design requirements are to be specified, or related sections where applicable Brown University Design and Construction Guidelines may appear, are indicated.
PART 2 - PRODUCTS

2.1 TEST STANDARD LISTINGS

A. Acceptable products are those tested to the listed standard(s). Manufacturer’s assertions of compliance shall be in submittals. Materials shall bear manufacturer’s marks as required by standard(s).

2.2 WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING

   1. Fittings: AWWA C110, ductile or gray iron and standard thickness.

B. Copper Tubing: ASTM B42, hard drawn or annealed.
   1. Fittings: ASME B16.18 cast copper alloy or ASME B16.22 wrought copper and bronze.

C. Copper Tubing: ASTM B42, annealed.
   2. Joints: Flare

D. PE Pipe: ASTM D2239, or ASTM D2447 minimum Schedule 40.
   1. Fittings: ASTM D2609, PE.
   2. Joints: Mechanical with stainless steel clamp.

E. PE Pipe: AWWA C901.

F. PB Pipe: ASTM D2662, ASTM D3000, or ASTM F809.
   1. Fittings: Copper or Nylon.
   2. Joints: Mechanical with copper band or stainless steel clamps.

G. PB Tubing: ASTM D2666.
   1. Fittings: ASTM F845.
   2. Joints: Mechanical with copper band or stainless steel clamps.

H. PB Pipe: AWWA C90

I. Fiberglass Pipe: AWWA C950.

2.3 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Copper Tubing: ASTM B42, hard drawn.
   1. Fittings: ASME B16.18 cast copper alloy or ASME B16.22 wrought copper and bronze.
B. Copper Tubing: ASTM B42, annealed
   2. Joints: Flare

C. Ductile Iron Pipe: AWWA C151.
   1. Fittings: Ductile iron, standard thickness.

   1. Fittings: ASTM D2609, PE.
   2. Joints: Mechanical with stainless steel clamps.

E. PB Pipe: ASTM D2662, ASTM D3000, or ASTM F809.
   1. Fittings: Copper or Nylon.
   2. Joints: Mechanical with copper band or stainless steel clamps.

F. PB Tubing: ASTM D2666.
   1. Fittings: ASTM F845.
   2. Joints: Mechanical with copper band or stainless steel clamps.

2.4 WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88 Type K, hard drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, solder, Grade 95TA.

B. Copper Tubing: ASTM B88, Type K, hard drawn.
   1. Fittings: Cast iron, coated

C. Steel Pipe: ASTM A53 minimum Schedule 40, galvanized (not allowed for potable or hot water piping).
   1. Fittings: Cast iron.

2.5 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 3 inches and Under:
   1. Ferrous pipe: minimum Class 150 malleable iron threaded unions.
   2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Pipe Size Over 1 inch:
   1. Ferrous pipe: minimum Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
2. Copper tube and pipe: minimum Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Grooved and Shouldered Pipe End Couplings:
1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.

D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, and water impervious isolation barrier.
1. Required at connection of steel to copper pipe. Bronze valves and fitting can serve as dielectric fitting.

2.6 PIPE HANGERS AND SUPPORTS

A. Plumbing piping hangers and supports: Conform to ASME B31.9 “Building Services Piping” or ASTM F708 “Standard Practice for Design and Installation of Rigid Pipe Hangers.”

B. Hangers for pipe sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.

C. Hangers for cold pipe sizes 2 inches and over: Carbon steel, adjustable, clevis.

D. Hangers for hot pipe, sizes 2 to 4 inches: Carbon steel, adjustable, clevis.

E. Hangers for Hot Pipe, sizes 6 inches and over: Adjustable steel yoke, cast iron pipe roll and double hanger.

F. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.

G. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.

H. Wall Support for Pipe Sizes to 3 inches: Cast iron hooks.

I. Wall Support for 4 inch and over Pipe Size: Welded steel bracket and wrought steel clamps.

J. Wall Support for Hot Pipe Sizes 6 inches and over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.

K. Vertical Support: Steel riser clamp.

L. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
M. Floor Support for Hot Pipe Sizes to 4 inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

N. Floor Support for Hot Pipe Sizes 6 inches and over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.

O. Copper Pipe Support: Carbon steel ring, adjustable, copper plate.

P. Pipe hangers and supports shall be matched to seismic zone for Providence, RI.

2.7 GATE VALVES

A. Manufacturers:
   1. Jenkins
   2. Substitutions: Not Permitted
   3. Ball Valves shall be used in place of gate valves for line sizes under 3”.

B. 3 inches and Larger:
   1. MSS Standard SP-70 “Cast Iron Gate Valves, Flanged and Threaded Ends,” minimum Class 125, iron body, bronze trim, outside screw and yoke, hand wheel, solid wedge disc, flanged ends with full gaskets.

C. 6 inches and Larger
   1. Furnish chain-wheel operators for valves mounted over 8 feet above floor.

2.8 GLOBE VALVES

A. Use where throttling may be required.

B. Manufacturers:
   1. Apollo
   2. Substitutions: Not Permitted

C. Up To and Including 3 inches:
   1. MSS SP-80 “Bronze Gate, Globe, Angle and Check Valves,” minimum Class 125, bronze body, bronze trim, hand wheel, bronze or Teflon disc, solder or threaded ends.

D. 2 inches and larger:
   1. MSS SP-85 “Cast Iron Globe & Angle Valves, Flanged and Threaded Ends,” minimum Class 125, iron body, bronze trim, hand wheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends.
   2. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.9 BALL VALVES

A. Manufacturers:
1. Apollo  
2. Milwaukee  
3. Substitutions: Not Permitted

B. Construction, 2-1/2 inches and Smaller: MSS SP-110 “Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends,” minimum Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, for all balancing applications solder ends.

2.10 BUTTERFLY VALVES

A. Manufacturers:
1. Jenkins  
2. Milwaukee  
3. Substitutions: Not Permitted

B. Construction, 1-1/2 inches and larger:
1. Minimum 200 psi, cast or ductile iron body, elastomer coated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, and infinite position lever handle with memory stop.  
2. Furnish gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.  
3. All lugged butterfly valves shall be fully bi-directional and bi-directionally dead end able to the full pressure rating of the seat rating, which is not reduced when pressure is applied in either direction. The valve is capable of serving as a blank flange when bolted to the end of the line from either side of the valve body and no mating flange is attached. The means of attaching the body to the pipe flange and attaching the seat ring to the body shall meet the ANSI class rating of the valve without mechanical failure. This requirement normally results in partially lugged butterfly valves not being acceptable.  
4. Packing shall be able to be tightened without removing the insulation.  
5. External disc position indicators shall be provided.  
6. Valves must be fully factory assembled, set and tested.

2.11 SWING CHECK VALVES

A. Manufacturers:
1. Jenkins  
2. Substitutions: Not Permitted

B. Up to and including 3 inches:
1. MSS SP-80, minimum Class 125, bronze body and cap, bronze swing disc with rubber seat, solder ends.

C. 2 inches and larger:
1. MSS SP-71, minimum Class 125, iron body, bronze swing disc, flanged ends.

2.12 SPRING LOADED CHECK VALVES

A. Manufacturers:
   1. Jenkins
   2. Substitutions: Not Permitted

B. Minimum Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.13 WATER PRESSURE REDUCING VALVES

A. Manufacturers:
   1. Taco
   2. Watts

B. Up to 2 inches:
   1. MSS SP-80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, and single union ends.

C. Over 2 inches:
   1. MSS SP-85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flange

2.14 RELIEF VALVES

A. Manufacturers:
   1. Taco
   2. Watts
   3. Substitutions: Not Permitted

B. Pressure Relief:
   1. AGA Z21.22 certified, bronze body, Teflon seat, steel stem and springs, automatic, direct pressure actuate.

C. Temperature and Pressure Relief:
   1. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F (98.9 degrees C), capacity ASME SEC IV certified and labeled.

2.15 FLUSH VALVES

A. Manufacturers:
   1. Sloan Royal
2. Substitutions: Not Permitted

2.16 BUILDING MIXING VALVES

A. Manufacturers:
   1. Symmons
   2. Substitutions: Not Permitted

B. Pressure balanced preferred.

C. Accessories
   1. Volume control shut-off valve on outlet.
   2. Stem thermometer on outlet.
   3. Strainer stop check valves on inlets.

2.17 TUB AND SHOWER PRESSURE BALANCED MIXING VALVES

A. Manufacturers:
   1. Symmons Temptrol
   2. Substitutions: Not Permitted

B. Valve: Chrome plated cast brass body, stainless steel cylinder and integral
temperature adjustment.

C. Valve capacity and signing shall be based on system gpm and psi.

D. Accessories:
   1. Volume control shut-off valve on outlet.
   2. Stem thermometer on outlet.
   3. Strainer stop checks on inlets.

2.18 FAUCETS

A. Manufacturers:
   1. American Standard
   2. Kohler
   3. Eljer
   4. Delta
   5. Chicago
   6. Substitutions: Not Permitted

2.19 STRAINERS

A. Size 2 inch and under:
   1. Threaded brass body for 175 psi CWP or Class 150, threaded bronze body
      300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
      Pressure rating of system shall determine valve rating

B. Size 1-1/2 inch to 4 inch:
1. Class 125, flanged iron body, Y pattern with 1/16-inch stainless steel perforated screen.

C. Size 5 inch and Larger:
1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

2.20 HOSE BIBS

A. Manufacturers:
1. J.R. Smith
2. Zurn
3. Josam
4. Substitutions: Not Permitted

B. Interior: Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, with hand wheel in mechanical rooms, lock shield and removable key in public spaces, and integral vacuum breaker in conformance with ANSI/ASSE 1011.

C. Interior Mixing: Bronze or brass, wall mounted, double service faucet with hose thread spout, integral stops, with hand wheels, and vacuum breaker in conformance with ANSI/ASSE 1011.

2.21 HYDRANTS

A. Manufacturers:
1. J.R. Smith
2. Josam
3. Zurn
4. Substitutions: Not Permitted

B. Wall Hydrant: ANSI/ASSE 1019; non-freeze, self-draining type with polished bronze hose thread spout, hand wheel in mechanical rooms, locks shield and removable key in public spaces and integral vacuum breaker.

C. Floor Hydrant: ANSI/ASSE 1019; polished bronze lockable recessed box, hose thread spout, lock shield and removable key, and vacuum breaker.

2.22 RECESSED VALVE BOX

A. Manufacturers:
1. J.R. Smith
2. Josam
3. Zurn
4. Substitutions: Not Permitted
B. Washing Machine: Plastic preformed rough-in box with brass long shank valves with wheel handles valves with single lever handle, socket for 2 inch waste, slip in finishing cover.

C. Refrigerator: Plastic preformed rough-in box with brass valves with wheel handle slip in finishing cover.

2.23 BACK WATER VALVES

A. Cast Iron: ANSI A1121.2; epoxy painted cast iron body and cover, brass valve, 6 inch extension sleeve, and access cover.

2.24 DIAPHRAGM-TYPE COMPRESSION TANKS

A. Manufacturers:
   1. Amtrol
   2. Substitutions: Not Permitted

B. Construction: Welded steel, tested and stamped in accordance with Section 8D of ASME Code; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.

C. Accessories: Pressure gage and air-charging fitting, tank drain; pre-charge to psi as shown on drawings.

2.25 IN-LINE CIRCULATOR PUMPS

A. Manufacturers:
   1. Taco
   2. Substitutions: Not Permitted

B. Casing: Bronze rated for 125 psig working pressure with stainless steel rotor assembly.

C. Impeller: Bronze.

D. Shaft: Alloy steel with integral thrust collar and two, oil lubricated bronze sleeve bearings.

E. Seal: Carbon rotating against a stationary ceramic seat.

F. Flexible drive coupling.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify excavations are to required grade, dry, and not over-excavate.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

3.3 INSTALLATION

A. Install non-conducting dielectric connections wherever joining dissimilar metals.

B. All flanges to be made up with full gaskets.

C. Route parallel and perpendicular to walls.

D. Hot water recirculation to banks of lavatories shall drop behind the fixtures to recirculate hot water to the most remote fixture.

E. Hot water recirculation lines shall be installed in systems where the distance to the farthest fixture exceeds 100 feet.

F. Install devices with adequate space for testing and maintenance.

G. Each building shall be protected separately, even if several buildings are on one service. Each building shall be protected by two reduced pressure backflow preventers with strainers, piped in parallel with ball or butterfly shut-off valves. Install with pressure gages on both sides of the reduced pressure backflow preventers.

H. Install water service with connection to municipal water supply with gate valve and curb box with locking cover. Water service entrances shall be equipped with dedicated building meter. Each meter is to be provided with a remote reader.

I. Water service to be designed with a minimum 10 psi cushion.

J. Provide separate irrigation service complete with backflow preventer and meter per Narragansett Bay Commission requirements, where landscape irrigation is supplied.
3.4 TESTING AND CERTIFICATION

A. Perform initial testing of all components.

B. Perform initial testing and certification of all testable backflow preventers.

END OF SECTION