

SECTION 22 00 00 - PLUMBING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 "Supplemental General Mechanical Conditions" are hereby made a part of the work of this section.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.

1.2 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections, and incidentals and the performing of operations required to provide a complete and functional plumbing system.
- B. Work shall be in accordance with the current edition of the Maine State Plumbing Code and applicable local ordinances.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:
  - 1. Piping materials.
  - 2. Valves.
  - 3. Pipe hangers.
  - 4. Fixtures and trim.
  - 5. Miscellaneous equipment.
  - 6. Water heating equipment.
  - 7. Piping, valves and equipment identification.
  - 8. Thermostatic mixing valve.
  - 9. Firestopping.
  - 10. Trap primers.
- E. Product Data: Submit data on product characteristics, performance criteria and limitations.
- F. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

PART 2 PRODUCTS

2.1 PIPING MATERIALS

- A. Soil and Waste (Sanitary) and Vent Piping: Sched. 40 PVC with solvent welded joints. Contractor shall use Purple Primer on all solvent welded joints.
- B. Domestic Water Piping:
  - 1. Pipe sizes 1-1/4" and larger: Type L hard copper tubing and cast bronze or wrought copper solder fittings.
  - 2. Pipe sizes 1" and smaller shall be one of the following:
    - a. Uponor AquaPEX, NSF rated, 180°F at 100psi, red (HW), blue (CW) and white (RHW).
    - b. Type L hard copper tubing and cast bronze or wrought copper solder fittings.
- C. Exposed Water and Waste Piping at Fixtures: I.P.S. copper with cast brass fittings chrome plated finish, with deep one piece escutcheon plates at traverse points.
- D. Solder: Lead-free (ONLY), Englehard Silvabrite 100, 440°F melting point, ASTM B32.

## 2.2 VALVES

- A. Ball Valves: Copper alloy with stationary seat ring and chromium plated or stainless steel floating ball per Federal Specification WW-V-35B. Blowout proof stem, reinforced PTFE seal. Sizes 2" and larger shall have threaded ends. Provide lever handle with stem extension as required to allow operation without interfering with pipe insulation.
- B. Check Valves: Horizontal Swing, MSS SP-80, Type 3, Class 125.
- C. Drain Valves: Provide ball valves with 3/4" hose connection and brass cap.
- D. Fixture Service Stop Valves: Angle Wheel Handle Stop, ASME A112.18M.
  - 1. Each plumbing fixture shall have individual stop valves in the hot and cold supplies.
  - 2. Service stop valves exposed in finished areas shall be chrome-plated brass; in non-finished areas, ball valves shall be used in lieu of chromed supplies.
- E. Temperature and Pressure Relief Valves: Bronze body, tested under ANSI Z21.22, AGA and ASME rated, 125 psig/210°F relief settings.
- F. Balancing Valves: Taco "Accu-Flo".
  - 1. Bronze or brass body and internals, teflon seats, memory stop, 300 psi working pressure, 250°F working temperature. Balancing devices shall have provisions for connecting a portable differential pressure gauge. Each balancing device shall be sized to provide a differential pressure reading between 2 and 5 feet with the valve full open at design flow rates.
  - 2. Install per manufacturer's recommendations for adjacent length of straight pipe.

3. Submittals shall indicate gpm, size, wide open differential pressure meter reading, and actual water pressure drop.
- G. Pressure Reducing Valves: Watts Regulator series U5LP bronze body, bronze internals, 200 psi working pressure, 200°F maximum temperature, adjustable pressure range 10-30 psig. Provide with inlet strainer (screen).

### 2.3 PIPE HANGERS

- A. Adjustable Swivel Hangers:
  1. Pipe sizes 2" and less: Carpenter and Paterson Fig. 800, oversize for insulated piping systems.
  2. Pipe sizes larger than 2": Carpenter and Paterson Fig. 100, oversize for insulated piping systems.
- B. Riser Clamp: Carpenter and Paterson Fig. 126 CT copper plated for copper piping, Fig. 126 for iron and PVC piping.
- C. Insulation Shields: 18 ga. galvanized steel, 180° wrap, Carpenter and Paterson Fig. 265P, Type H.
- D. All piping 20' upstream and downstream of pumps shall also have Mason Industries PC30N precompressed double deflection spring isolators installed.

### 2.4 FIXTURES AND TRIM – TO BE SELECTED BY OWNER

- A. (P-1) Water closet, seat and trim.
- B. (P-2) Drop-in lavatory, faucet, drain and trim.
- C. (P-3R/L) Tub/shower, controls, drain and trim.
- D. (P-4) Kitchen sink, faucet, drain and trim.
- E. (P-5) Washing machine supply and drain box.
- F. (ICE) Ice maker CW connection box.

### 2.5 MISCELLANEOUS EQUIPMENT

- A. Floor Drain, concrete floors (FD): Zurn Z-415, cast iron body with 3" bottom outlet, combination invertible membrane clamp, sediment bucket and adjustable collar. Strainer shall be 6" diameter Zurn "Type H" with clamping device, polished nickel-bronze. Floor drains shall have "deep seal" traps and trap primer connection, connect to nearest plumbing fixture.
- B. Floor Drain, wood deck (FD): Zurn FD-2240, cast iron body with steel flange for wood deck mounting with flexible sheet flooring, 3" bottom outlet, nickel top. Floor drains shall have a trap primer connection and be connected to the nearest plumbing fixture.

- C. Floor/Yard Cleanout (FCO/YCO): Zurn Z-1400 adjustable floor cleanout, cast iron body, with gas and watertight ABS tapered thread plug. Provide size equal to piping served with maximum size of 4".
  - 1. Concrete floor finishes: Scoriated round polished bronze top.
  - 2. Sheet tile finishes: Scoriated square polished bronze top recessed to receive tile.
  - 3. Carpeted finishes: Scoriated round polished bronze top and carpet marker.
- C. Wall Cleanout (WCO): Sanitary tee with threaded raised nut or countersunk-nut cleanout plug located behind Zurn Z-1468 round stainless steel wall access cover.
- D. Vacuum Breaker: Watts Model LFN36, 3/4" size, 15 CFM capacity.
- E. Strainer: Watts Series 777, MIL-S-16293, bronze body wye-type, 200 WOG rating, screwed end connections, 20 mesh stainless steel, monel, or bronze screen.
- F. Backflow Preventor (BFP): Conforming to AWWA C506, FCCHR-USC Manual Section 10, and UL listed. Types, sizes and capacities scheduled and as required by Water District or Code Enforcement.
  - 1. Double Check (DC): Double check backflow assembly with test ports, bronze body with stainless steel springs, corrosion resistant internals, stop and waste ball valves.
  - 2. Atmospheric Double Check (DCA): Double check continuous pressure type with atmospheric port for low hazard applications, 250°F maximum water temperature, bronze body, stainless steel internals with rubber seals and integral strainer.
  - C. Reduced Pressure Zone (RPZ): Reduced pressure principle type; bronze body with stainless steel internals. Provide bronze body ball valves, test cocks, and air gap fittings.
- G. Freezeless Wall Hydrant (FPHB): Woodford Model B65, 3/4" size, brass body, automatic draining, recessed box with door, loose key tee, with anti-siphon vacuum breaker.
- H. Interior Wall Hydrant (HB): Woodford Model B79, 3/4" size, brass body, automatic draining, recessed box with door, loose key tee, with anti-siphon vacuum breaker.
- I. Thermometers: Terrice Series V80445 or Ashcroft Series 600A-04, vapor actuated, adjustable angle, 4-1/2" diameter face, cast aluminum case, stainless steel ring, glass window, white background dial with black figures, black finished stainless steel pointer, brass movement with bronze bearings, phosphor bronze bourdon tube. Accuracy shall be to within one scale division.
  - 1. Thermowell: Provide with brass thermometer wells projecting a minimum of 2" into the pipe with extension to face of insulation. Provide with heat transfer fluid to fill interstitial space between bulb and well.
  - 2. Range: 30°F to 240°F for domestic hot water systems.

- J. Pressure Gauges: Terrice Series 800 or Ashcroft Type 1005, Grade B, 3-1/2" dial, ANSI B40.1, drawn steel case, white background dial with black figures, clear glass window, brass movement, beryllium copper bourdon tube, 0 to 100 PSI range, accuracy shall be within 2% over middle half of scale and 3% over the remainder. Provide with shut off petcock and restrictor.
- K. Circulator (inline)(CP): Taco model indicated, pumps shall be inline cartridge-type or close coupled pump of capacity and performance indicated with stainless steel construction for potable water applications, 125 psig rated working pressure, 200°F maximum water temperature, carbon Ni-resist mechanical seal, flexible coupling, resilient-mount drip-proof sleeve bearing motor. The pumps shall be factory tested, cleaned and painted with machinery enamel. A set of installation instructions shall be included with pump. Provide high efficiency motors if available as an option of the manufacturer. If high efficiency motors are not available as an option of the manufacturer, submit a certification stating same.
- L. Water Hammer Arrestor (Shock Absorber): Plumbing and Drainage Institute listed.  
  
Schedule:  
  
"A" - Size #100 PDI - 0-11 Fixture Units  
"B" - Size #200 PDI - 12-32 Fixture Units  
"C" - Size #300 PDI - 33-60 Fixture Units
- M. Strainer: Watts Series 777, MIL-S-16293, bronze body wye-type, 200 WOG rating, screwed end connections, 20 mesh stainless steel, monel, or bronze screen.
- N. Trap Primer (TP): Zurn Z-1022 Automatic Trap Primer, all bronze body with integral vacuum breaker, non-liming internal operating assembly with gasketed bronze cover, flow-thru design operates on a 2-5psi pressure drop and with low-flow fixtures.
- O. Indirect Waste Receptor (IW): Zurn Model Z1025-4, 4", fixed air gap, dura-coated cast-iron, with Z1000-P, trap primer connection.
- P. Washing Machine Drain Pans: Oatey Model 34051 or Driptide, 28"x30"x1.75"D., plastic with 1" drain fitting.

## 2.6 WATER HEATING EQUIPMENT

- A. Electric Water Heaters (WH): The electric water heater shall be HTP Everlast EVC040-C2W060N, AO Smith, State Industries or approved equal. The water heater shall be medium duty commercial, 40 gallon capacity, with a dual 6000 watt element, 240v-1phase. The tank shall be stainless steel and have foam insulation with a minimum R-value of 16. Furnish an ASME pressure and temperature relief valve and drain valve. The water heater shall have a ten (10) year warranty in commercial service. The water heater shall be UL-listed and meet ASHRAE Standard 90.1b-1990 for energy efficiency. Installation shall be in accordance with the manufacturer's recommendations.
- B. Expansion Tank (ET): Amtrol pressurized diaphragm expansion tank, 100 psi working pressure, precharge to 55 psi.
- C. Thermostatic Mixing Valve (TMV): Honeywell AMX300TLF, lead-free.

## 2.7 PIPING, VALVE, AND EQUIPMENT IDENTIFICATION

- A. Piping identification: Provide plastic "wrap-around" identification markers indicating flow and fluid flowing for the following:
1. Domestic Hot Water
  2. Recirculated Domestic Hot Water
  3. Domestic Cold Water
  4. Vent Piping
  5. Exposed Above-ground Sanitary Drain Piping
- B. Markers shall be placed 30-50 ft. apart for piping in accessible areas.
- C. Markers shall be placed outside the pipe insulation and in the most obvious location for viewing.
- D. Valve Tags:
1. Attach to each valve a 1-1/2" round or octagonal brass tag with 1/2" indented numerals filled with a durable black compound. In addition to the valve numbers, each tag shall identify the system it controls. Service stop valves exposed in finished areas need not be tagged.
  2. Tags shall be securely attached to stems of valves with copper or brass "S" hooks, or chains.
  3. Valve charts shall be provided for each piping system and shall consist of schematic drawings of piping layouts, showing and identifying each valve and describing its function. Upon completion of the work, one (1) copy of each chart, sealed to rigid backboard with clear lacquer placed under glass and framed, shall be hung where directed. Two (2) additional unmounted copies shall be delivered to the Architect.
- E. Equipment Identification: Provide laminated plastic nameplates for equipment, pumps, mixing valves, backflow preventers, and balancing valves. Nameplates shall be laminated 0.125-inch thick melamine plastic conforming to Fed. Spec. L-P-387, black with white center core. Surface shall be a matte finish, corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be minimum of 0.25-inch high normal block lettering.

## PART 3 EXECUTION

### 3.1 SURFACE CONDITIONS

- A. Inspection:
1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.

2. Verify that plumbing may be installed in strict accordance with pertinent codes and regulations and the reviewed Shop Drawings.

### 3.2 INSTALLATION OF PIPING

- A. Provide and erect in accordance with the best practice of the trade piping shown on the drawings and as required to complete the intended installation. Make offsets as shown or required to place piping in proper position to avoid other work and to allow the application of insulation and finish painting to the satisfaction of the Architect.
- B. The size and general arrangements, as well as the methods of connecting piping, valves, and equipment, shall be as indicated, or so as to meet the requirements of the Architect.
- C. Piping shall be erected so as to provide for the easy and noiseless passage of fluids under working conditions.
- D. Install unions to facilitate removal of equipment.
- E. Copper pipe shall be reamed to remove burrs.
- F. Connections between copper and steel piping shall be made with dielectric fittings.
- G. Solder joints shall be made with lead free solder. Clean surfaces to be soldered and use a paste flux. Wash joints with sodium bicarbonate and water to remove corrosive effects of heated solder paste. Caution: Lead-bearing solder is not permitted.
- H. Pipe penetrations through walls, floors and ceilings shall be in accordance with Section 23 05 00 "Supplemental General Mechanical Requirements". Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.
- I. Provide a cleanout in the vertical position at the base of each sanitary and roof drain drop.
- J. Sanitary and vent piping shall be sized and installed at 1/4" per foot slope.
- K. Rainwater piping shall be sized and installed at 1/8" per foot slope.
- L. All vertical and horizontal penetrations through walls, floors and ceilings shall be sealed against air movement between spaces.

### 3.3 PIPE HANGERS

- A. Impact driven studs are prohibited.
- B. Copper Tubing: supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

Copper Size	Hanger Intervals	Rod Sizes
1/2"	5'	3/8"
3/4"	6'	3/8"
1"	6'	3/8"
1-1/4"	8'	3/8"

1-1/2"	8'	3/8"
2"	10'	3/8"

- C. Cast Iron Pipe: Supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

Cast Iron Size	Hanger Intervals	Rod Sizes
1-1/2"	5'	3/8"
2"	5'	3/8"
2-1/2"	5'	1/2"
3"	6'	1/2"
4"	7'	5/8"

- D. PVC/CPVC Pipe: Supported at 4 foot intervals.
- E. Verticals: Supported by use of clamp hangers at every story height, and at not more than 6 feet intervals for copper piping 1-1/4" and smaller size.
- F. Spring Isolators: All pipe 20' upstream and downstream of pumps.

### 3.4 CLOSING IN UNINSPECTED WORK

- A. General: Cover up or enclose work after it has been properly and completely reviewed.
- B. If any of the work is covered or enclosed prior to required inspections and review, uncover the work as required for the test and review. After review, tests and acceptance, repairs and replacements shall be made by the appropriate trades with such materials as necessary for the acceptance by the Architect and at no additional cost to the Owner.

### 3.5 CLEANUP AND CORROSION PREVENTION

- A. Upon completion of the work thoroughly clean and flush piping systems to the sewer with water.
- B. Fixtures, piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- C. Caulk around fixtures at floor and wall.
- D. Before covering is applied to piping systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

### 3.6 DISINFECTING

- A. After the entire potable water system is completed, cleaned and tested, and just before the building is ready to be occupied, disinfect the system as follows: After flushing the mains, introduce a water and chlorine solution for a period of not less than three hours before final flushing of the system.



3.7 TESTS

- A. Sanitary soil, waste and vent piping: Fill with water to top of vents, and test as required by Code.
- B. Water piping shall be tested to a pressure of 100 lbs. per square inch for at least 30 minutes. Pressure drop in this period shall not exceed two pounds per square inch. Leaks shall be repaired and system retested. Notify Architect 24 hours before test is to be performed.

3.8 INSTRUCTIONS

- A. On completion of the project, provide a competent technician to thoroughly instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner.

3.9 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

\* END OF SECTION \*