SECTION 22 30 00 - PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General Design Requirements

B. Water Heaters:
   2. Commercial electric.

C. Domestic water heat exchangers.

1.02 GENERAL DESIGN REQUIREMENTS

A. Domestic Water System

1. Cold water systems will be sized using CPC flush valve curves, and hot water systems using flush tank curves. Equipment branches and main pipe size will be based on flow requirements without diversity.

2. All plumbing valves will be located behind a lockable access panels when they are in a concealed location.

3. Hose bibs will be provided on the roof of each building. The hose bibs will be spaced 50 ft apart, maximum.

4. Chrome plated stops with gasket seats will be provided for sinks, lavatories, and wash basins when exposed to public view. A hose bibb with vacuum breaker will be provided under the lavatories in each toilet room. Exposed branch water supply piping in toilet rooms and custodial rooms will be chromium plated.

5. Water hammer arrestors will be provided in the wall, as required, behind a lockable access panel. Trap primers from lavatory tailpieces or water closet flush-o-meter valves for floor drains will also be provided.

6. Isolation valves and unions at equipment connections will be provided.

7. The water piping will be designed to provide a minimum residual pressure at the most remote water closet of at least 30 psig. Pressure regulators will be installed to comply with California Plumbing Code.
   a. The maximum water pipe velocity will be 5 ft/sec. for hot water and 8 ft./sec for cold water.
b. The minimum supply pipe size will be 1/2" for one plumbing fixture with a maximum flow of 1.25 gpm.

c. Fixture pipe sizes will be as follows: 1-1/2" for a flush valve water closet, 3/4" for a shower, 1/2" for sink and 3/4" for hose bibs.

8. Domestic water piping within the buildings will be “Viega” pro-press or equal copper tubing and shall conform to ASTM B 75 or ASTM B88, Fittings shall be copper in conformance with ASTM B16.18, ASTM B16.22 or ASTM B16.26. O-rings for copper press fittings shall be EPDM.

Domestic Water Filtration Equipment.

B. Building Pure Water Systems

1. Building (house) pure water systems shall be designed to guarantee a water quality level of at least Lab Grade 3 per National Committee for Clinical Laboratory Standards (NCCLS) at all times. Individual laboratories requiring a guarantee of purer water shall install additional purification equipment in the laboratory as part of the building equipment (reference; Letter of Understanding dated 3-19-90, J. West; Physical Plant to K. McCaffrey; Natural Sciences).

2. The makeup water shall include pre-treatment consisting of a prefilter, a water softener, an activated carbon absorption filter, and a five (5) micron filter followed by treatment which shall consist of a reverse osmosis (RO) unit, mixed bed deionizer exchange service tanks, an ultra-violet light, and a 0.2 micron filter. Make up water capacity shall be determined in conjunction with sizing of the system storage tank.

3. The entire piping system shall be continually circulated. Dead legs shall be limited to drops to individual lab outlets. (Confirm maximum dead leg distance for each application) The entire circulating volume shall be exposed to ultra-violet light on each circulation. Provide dual stainless-steel circulation pumps to allow for continued circulation in the event of pump failure.

4. The system shall include a storage tank sized to allow make up to occur over a 12-hour period while accommodating maximum anticipated use with 20 % excess capacity. Determination of maximum system use shall include a diversity factors which shall be determined with the University’s Representative for each system.

5. The system shall include a side stream polishing loop which will continually circulate a portion of the water circulating through the system back through the mixed bed deionizers prior to return to the storage tank.
6. Provide a back pressure valve on the return piping to the storage tank set to assure adequate pressure at the highest most laboratory faucet.

7. Provide pressure gauges on both sides of all filters and pumps.

8. Building (house) pure water systems shall be monitored by the Building Management System to provide alarms to the Physical Plant watch stander at the campus Central Heat Plant. Alarms shall be generated in the case of Water quality (conductivity) out of range, low tank level, and no flow.

C. Acceptable Piping Materials:

1. Socket fused polypropylene prepared specifically for deionized service. Pipe shall be sterilized and capped immediately after production. Fittings, valves, and unions shall be sterilized and individually wrapped immediately after production. Continuous trough support system.

2. Schedule 80 PVC with solvent weld fittings prepared specifically for deionized service. Pipe shall be sterilized and capped immediately after production. Fittings, valves, and unions shall be sterilized and individually wrapped immediately after production. Continuous trough support system. Stainless steel could be used in some applications.

3. Confirm piping material with the University’s representative on a case by case basis.

4. Valves shall be diaphragm type.

D. Valving:

1. Pure water piping systems shall be provided with manual isolation valves at the following locations:

   a. At each floor where branch piping connects to a riser.

   b. On both sides of piping elements which may need to be removed for servicing including filters, pumps, ultraviolet lights, mixed bed deionizers, and RO Units.

   c. At branch connections to mains.

   d. Provide provisions for system drain down to a floor drain including drain down of storage

1.03 SUBMITTALS

A. See Division 1 for submittals procedures.
B. **Product Data:**
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Provide electrical characteristics and connection requirements.

C. **Shop Drawings:**
   1. Indicate heat exchanger dimensions, size of tappings, and performance data.

D. **Project Record Documents:** Record actual locations of components.

### 1.04 QUALITY ASSURANCE

A. **Manufacturer Qualifications:** Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. **Certifications:**
   1. **Water Heaters:** NSF approved.
   2. **Gas Water Heaters:** Certified by CSA International to ANSI Z21.10.1, as applicable, in addition to requirements specified elsewhere.
   3. **Electric Water Heaters:** UL listed and labeled to UL 174.
   4. **Products Requiring Electrical Connection:** Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

### PART 2 PRODUCTS

#### 2.01 WATER HEATERS

A. **Manufacturers:**
   1. A.O. Smith Water Products Co: www.hotwater.com
   2. Rheem Manufacturing Company: www.rheem.com

B. **Commercial Gas Fired:**
   1. **Type:** Automatic, natural gas-fired, vertical storage.
   2. **Performance:**
   3. **Tank:** Glass lined welded steel ASME labeled; multiple flue passages, 4 inch (100 mm) diameter inspection port, thermally insulated with minimum 2 inches (50 mm) glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
4. Accessories:
   b. Dip Tube: Brass.
   c. Drain valve.
   d. Anode: Magnesium.

5. Certified for The Following Applications:
   a. Automatic storage water heater.
   b. Automatic circulating tank water heater.

C. Commercial Electric:
   1. Type: Factory-assembled and wired, electric, vertical storage.
   2. Performance:
   3. Electrical Characteristics:
   4. Accessories:
      b. Dip Tube: Brass.
      c. Drain valve.
      d. Anode: Magnesium.
   5. Heating Elements: Flange-mounted immersion elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 75 W/sq. in. (11.6 W/sq. m.).

2.02 DOMESTIC WATER HEAT EXCHANGERS

A. Manufacturers:
   2. Bell & Gossett, a xylem brand: www.bellgossett.com/#sle.
   3. A. O. Smith

B. Type: Double wall type that separates the potable water from the heat transfer medium with a space vented to the atmosphere in accordance with ICC IPC.

C. Tubes: U-tube type with 3/4 inch (19 mm) diameter seamless copper tubes suitable for 125 psi (860 kPa) working pressure.
D. Heads: Cast iron or steel, with steel tube sheets, threaded or flanged for piping connections.

E. Water Chamber and Tube Bundle: Removable for inspection and cleaning.

F. Coating: Prime coat exterior.

G. Code: ASME BPVC-VIII-1 for service pressures, ASME "U" symbol stamped on heat exchanger.

END OF SECTION  22 30 00