PART 1: GENERAL

1.01 Purpose

A. This standard is intended to provide useful information to the Professional Service Provider (PSP) to establish a basis of design. The responsibility of the engineer is to apply the principles of this section so that the University may achieve a level of quality and consistency in the design and construction of their facilities. Deviations from these guidelines must be justified through LCC analysis and submitted to the University for approval.

B. Reference ASME A17.1 for elevator sumps and sump pump requirements.

1.02 Codes and Standards

A. Plumbing Code Compliance: Comply with applicable portions of International Plumbing Code pertaining to selection and installation of Plumbing materials and products. Note that the City of Austin (COA) follows the Uniform Plumbing Code and all systems that interface with COA infrastructure must comply accordingly.

B. Plumbing and Drainage Institute: WH-201.

C. ASSE 1013 – Performance Requirements for Reduced Pressure Principle Backflow Preventers.

D. ASSE 1003 – Performance Requirements for Water Pressure Reducing Valves.

E. ASME Boiler and Pressure Vessel Code.

F. HI Compliance: Design, manufacture, and install plumbing pumps in accordance with “Hydraulic Institute Standards.”

G. UL Compliance: Design, manufacture, and install plumbing pumps in accordance with UL 778 “Motor Operated Water Pumps.”

H. SSPMA Compliance: Test and rate sump and sewage pumps in accordance with SUMP and Sewage Pump Manufacturers Association (SSPMA) and provide certified rating seal.


1.03 Requirements

A. Provide water hammer arrestors, complete with accessible isolation valve, in hot and cold water lines at the end of each battery of plumbing fixtures and at each plumbing fixture location remote from a battery of fixtures. Size in accordance with PDI WH-201.

B. Isolate domestic water lines for building services from cross connection by means of two code-approved backflow preventer in for each water feed to the building. Provide additional backflow prevention devices in process water connections and fire system connections off the main building service.

C. Provide backflow preventers at any connection between potable and non-potable water systems.

D. Provide clean-out capability for domestic hot water return piping in recirculating loops. Provide a capped
tee fitting at each ninety-degree turn in the piped return system.

E. Route groups of pipes parallel to each other with spacing to allow for insulation and valve service.

F. Provide dielectric couplings at connections between dissimilar metals.

G. Provide sectional valves on each branch and riser, close to main, where branch or riser serves 2 or more plumbing fixtures or equipment connections.

H. Provide shutoff valves installed on inlet of each plumbing equipment item and on inlet of each plumbing fixture.

I. Provide drain valves at equipment, bases of risers, and low points in system to completely drain potable water system.

J. Provide soft-seat check valves on discharge side of each pump.

K. Provide balance cocks in each hot water recirculating loop.

L. In all cases, Designer shall evaluate system conditions and select the optimum pump type and configuration based on pump efficiency and characteristics.

M. Recommend in-line circulating pumps or close-coupled end suction pumps for low flow (up to 50 GPM) circulating systems.

N. Recommend base-mounted end suction pumps for circulating systems with flow rates between 50 and 500 GPM.

O. Pumps furnished as part of factory-fabricated equipment, such as a part of booster pump skids, are to be end-suction, if available.

P. Provide all booster pumps with a valved bypass line to facilitate maintenance.

Q. Cleanouts for fixture banks shall be located above fixture flood level.

R. Provided dedicated shutoff valve for outdoor hose bibs and fixtures.

PART 2: PRODUCTS

2.01 Pipes and Pipe Fittings

A. Pipe Size 2" and Smaller
   1. Copper tube; Type "L", hard-drawn wrought-copper fittings, solder-joints. Use Dutch Boy or Silvabrite 100 lead-free solder, Composition 95/5, Solder Filler Metals: ASTM B 32, Solder containing lead is not permitted.
   2. Copper Tube; Type “L” with copper Press Fittings with rubber O-rings made with hydraulic compression tool, Viega ProPress or approved equal.
   3. Piping smaller than ¾” shall not be allowed.

B. Pipe Size 2 1/2 and Larger:
   1. Copper tube; Type "K", hard-drawn wrought-copper fittings, brazed sil-fos-joints manufactured by
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Sil-fos, Solder Filler Metals: Solder containing lead is not permitted.

2. Copper Tube 2-1/2 to 4”; Type "K", with copper Press Fittings with rubber O-rings and stainless steel grip ring made with hydraulic compression tool, Viega ProPress or approved equal.

C. Piping 6” and larger shall be ASTM A53 galvanized steel pipe, schedule 40, with rolled grooved ends and mechanical couplings.

D. Exterior below grade or below concrete slab equipment or fixture supply feeds: Piping shall be Type K copper, soft-annealed temper, with wrought copper fittings and lead free jointing.

E. Below building concrete slab - Tube size ¾” and larger: type "K" soft - annealed copper coil tubing. Copper tubing installed below building concrete slab on grade shall be installed without solder joints.

F. Underground water main piping systems: All pipe used for underground water piping mains shall be Class 50 ductile iron pipe, arranged with bell and spigot mechanical joints, fully restrained with retaining glands. Class 51 for 3” and 4” and Class 50 for 6” and larger,

2.02 Piping Specialties

A. Provide basket strainers with cast-iron body, 125-psi flanges, bolted type or yoke type cover. Furnish with removable, non-corrosive perforated strainer basket, with 1/8" perforations and lift-out basket handle.

2.03 Bibbs and Faucets

A. Hose Bibbs shall be threaded end, bronze body, renewable composition disc, tee handle, ¾” NPT inlet, and ¾” hose outlet. Provide with vacuum breaker.

B. Sill Faucets shall be bronze body, renewable composition disc, wheel handle, ¾” solder inlet, ¾” hose outlet. Provide with vacuum breaker.

2.04 Hydrants

A. Recessed Non-Freeze Wall Hydrants: Case-bronze casing, length to suit wall thickness, vacuum breaker, hinged locking cover, ¾” inlet, and hose outlet.

B. Project Non-Freeze Wall Hydrants: Cast-bronze hydrant, chrome plate face, tee handle key, bronze casing, length to suit wall thickness, vacuum breaker, ¾” inlet, hose outlet.

C. Projected Non-Freeze Wall Hydrants: Cast bronze hydrant, chrome-plated face, tee handle key, bronze casing, length-to-suit wall thickness, vacuum breaker, ¾” inlet, hose outlet.

D. Floor Level Non-Freeze Hydrants: Bronze hydrant, rough bronze box, tee handle key, bronze casing, length to suit depth of bury, drain hole, vacuum breaker, hinged locking cover, ¾” inlet, hose outlet.

E. Non-Freeze Post Yard Hydrants: Bronze hydrant, tee handle key, bronze casing with cast-iron casing guard, length to suit depth of bury, drain hole, vacuum breaker, ¾” inlet, hose outlet.

2.05 Backflow Preventers

A. Shall be of the reduced pressure zone (RPZ) type. The assembly shall include shutoff valves on inlet and
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outlet, and strainer on inlet. Backflow preventers shall include test cocks, and pressure-differential relief valve located between 2 positive seating check valves. Construct in accordance with ASSE Standard 1013. Coordinate the exact model of the backflow preventer with the University prior to incorporation into the design.

B. Provide backflow preventers at any connection between potable and non-potable water systems. Refer to Products section.

2.06 Pressure Regulating Valves

A. Shall be single seated, direct operated type, bronze body, integral strainer, complying with requirements of ASSE Standard 1003. Provide inlet and outlet shutoff valves and throttling bypass valve. Provide pressure gauge on valve outlet.

2.07 Relief Valves

A. The standard relief valves shall be manufactured in accordance with ASME Boiler and Pressure Vessel Code. Valves shall be combined pressure-temperature relief valves with bronze body, test lever, thermostat and shall comply with ANSI 21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 °F and pressure relief at 150 psig.

2.08 Pumps

A. In-Line Recirculation Pumps
1. Provide maintenance-free circulator pumps designed for 125 psig working pressure 225 °F continuous water temperature and specifically designed for quiet operation.
2. Body: Stainless steel fitted construction with iron body.
3. Shaft: Steel, ground and polished, metal impregnated carbon thrust bearing.
4. Motor: Non-overloading at any point on pump curve, open, drip proof, sleeve bearings, quiet operating, rubber mounted construction, built-in thermal overload protection.

B. Water Pressure Booster System
1. General: Provide factory-fabricated and tested water pressure booster system consisting of diaphragm type water tank, centrifugal pumps, power and control panels, instrumentation, and operating controls. It is a University Standard to provide pumps with a valved bypass to facilitate maintenance.
2. Pumps: Provide two (2) constant speed, single stage, end-suction design, cast-iron; bronze fitted centrifugal pumps with mechanical shafts seals. Mount pumps on vibration insulators. Provide temperature probe and electric purge valve immediately upstream of each PRV. Provide drip-proof motors.
3. Water Tank: Provide factory pre charged diaphragm type water tank with replaceable flexible membrane. Construct in accordance with ASME Code and provide ASME stamp for 125-psi minimum.
4. System Controls: Maintain system pressure with pilot-operated diaphragm type combination pressure regulating and non-slam check valve on each pump discharge line.
   a) Provide low system pressure switch located on discharge header to sense drop in system pressure, and to activate alarm and automatically start standby pump.
   b) Provide adjustable vane type flow switch to sequence lag pump.

C. Control Panel Enclosure:
1. Provide UL-listed, NEMA 1, hinged door, and lockable control panel enclosure.
D. **Duplex Pedestal Type Sump Pumps:**
   1. **Pump:** Duplex, centrifugal, semi-open impeller type sump pump, complete with galvanized steel strainer, cast-iron base plate, suction plate and casing, and cast-iron or bronze impeller.
   2. **Shaft:** Stainless steel of length to suit depth of basin, connected with flexible coupling to motor, and intermediate sleeve bearing for lengths over 4’.
   3. **Motor:** Open drip-proof, electrical characteristics as scheduled.
   4. **Basin:** Fiberglass construction of indicated dimensions, with inlet connections of size and location as indicated. Maintain minimum of 3’ depth below lowest inlet invert.
   5. **Cover:** Cast-iron or steel circular cover with manhole or hand hole opening, depending on diameter. Provide openings for pump, control rod, and discharge piping.
   6. **Controls:** Pump controls shall include float switch with gas-tight seals, bronze or stainless steel floats and rods, alternator, high level automatic alarm switch with gas-tight seals Auxiliary BAS alarm contacts and provisions for activation of a remote alarm light. Control panel shall be a factory-wired NEMA Type 1 (non-metallic) enclosure and shall include (HOA) two hand-off-auto switches, electric auto alternator circuit, combination motor controller with circuit breaker, control power transformer, and pump running lights. Alarm switch and all controls shall operate on 120 VAC (fuse protected circuit), 60 hertz, U.L. 508 listed industrial controls label.
   7. Provide main disconnect switch.

E. **Submersible Sump Pumps:**
   1. **Pump:** Cast-iron shell, bronze impeller, stainless steel shaft, factory-sealed grease lubricated ball bearings, ceramic mechanical seal, and perforated steel strainer.
   2. **Motor:** Hermetically sealed, capacitor-start, with built-in overload protection, electrical characteristics as scheduled. Provide 20’ of 3-conductor PVC cord and molded grounding plug.
   3. **Controls:** Float-operated mercury switch.
   4. Provide with stainless steel safety/lifting chain or slide rail system.
   5. Provide connections points in piping to facilitate rapid tie-in of temporary pumps during emergency situations.
   6. **Controls:** Pump controls shall include float switch with gas-tight seals, bronze or stainless steel floats and rods, alternator, high level automatic alarm switch with gas-tight seals Auxiliary BAS alarm contacts and provisions for activation of a remote alarm light. Control panel shall be a factory-wired NEMA Type 1 (non-metallic) enclosure and shall include (HOA) two hand-off-auto switches, electric auto alternator circuit, combination motor controller with circuit breaker, control power transformer, and pump running lights. Alarm switch and all controls shall operate on 120 VAC (fuse protected circuit), 60 hertz, U.L. 508 listed industrial controls label.
   7. Provide main disconnect switch.

F. **Duplex Sewage Ejector Pumps:**
   1. **Pump:** Duplex (Two) centrifugal, self-priming, solids handling pumps with a cast iron body and cast iron or ductile iron impeller.
   2. **Shaft:** Carbon steel, connected with flexible coupling to monitor.
   3. **Motor:** Open drip-proof, electrical characteristics as scheduled.
   4. **Basin:** Fiberglass construction of indicated dimensions, with inlet connections of size and location as indicated. Maintain minimum of 4’ depth below lowest inlet invert.
   5. **Cover:** Cast-iron or steel circular cover with manhole or hand hole opening, depending on diameter. Provide openings with gas tight seals for controls, vent, and suction piping.
   6. **Controls:** Pump controls shall include float switch, bronze or stainless steel floats and rods, alternator, high level automatic alarm switch, Auxiliary BAS alarm contacts and provision for activation of a remote alarm light. Control panel shall be a NEMA Type 1 (non-metallic) enclosure and shall include (HOA) two hand-off-auto switches, electric auto alternator circuit, combination motor controller with circuit breaker, control power transformer, and pump running lights. Alarm switch and all controls shall operate on 120 VAC (fuse protected circuit), 60 hertz, U.L. 508 listed industrial controls label.
   7. Provide main disconnect switch.
PART 3: EXECUTION

3.01 Pipe Testing Procedures:

A. Refer to 6.02.10 Appendix: Pipe Testing Procedures for plumbing pipe testing procedures.

END OF STANDARD