

**SAM HOUSTON STATE UNIVERSITY
DESIGN AND CONSTRUCTION STANDARDS**

DIVISION 22 00 00

PLUMBING

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22 00 00 GENERAL PLUMBING

- 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. For equipment providing critical services, provide N+1 redundancy. Definition of “critical services” to be evaluated during design with SHSU.
- C. Include a 0-100 psig pressure gauge on the domestic water header. Also include an electronic pressure sensor on the header, suitable for connection to University BAS system. Provide a gauge tap on the incoming water line upstream of both the water meter and backflow prevention device.
- D. General Plumbing Installation Notes:
 - 1. All piping and fittings shall be domestically manufactured.
 - 2. Pulled tees are prohibited.
 - 3. Homemade pipe fittings are prohibited.
 - 4. CPVC piping is prohibited.
 - 5. No homemade plumbing fittings allowed.
 - 6. Do not locate plumbing piping or equipment in transformer vaults, elevator hoist-ways, elevator equipment rooms, electrical rooms, telecommunications rooms, or stairwells.
 - 7. Provide sufficient unions, flanges, and isolation valves to permit removal of equipment.

22 05 00 COMMON WORK RESULTS FOR PLUMBING

- A. Refer to Design Standard 23 05 00 for motor requirements, sleeves & sleeve seals, escutcheons, meters & gages, hangers & supports, and mechanical identification.

22 05 23 VALVES

- A. Valve Requirements:
 - 1. Ball Valves: Bronze body; two-piece; full-port; stainless-steel trim; Teflon seat; threaded or flanged ends.
 - (i) Preferred manufacturers: Watts and Nibco.
 - 2. Butterfly Valves: Ductile iron body; lug type, suitable for bidirectional dead-end service at rated pressure without use of downstream flange; EPDM seat; one or two piece stainless-steel stem; aluminum bronze, nickel-plated, coated ductile iron, or stainless-steel disc.
 - a. Preferred manufacturers: Pratt, Bray, Nibco.
 - 3. Spring Loaded Check Valves:
 - a. Bronze body; in-line spring lift check; silent closing; Teflon disc; integral seat; threaded ends.
 - b. Cast iron body; wafer style; bronze seat; center guided bronze disc; stainless steel spring and screws; flanged ends.
 - c. Cast iron body; wafer style with split disc design; silent operating type; stainless steel disc and spring; flanged ends.
 - 4. NSF 61 and NSF 372 for valve materials for potable-water service.
 - 5. Valve class and pressure/temperature rating shall be adequate for system fluid.
 - 6. Valves installed in insulated piping shall include minimum 2-inch stem extension. Operation of handle shall not damage vapor barrier or disturb insulation. Memory stops should be fully adjustable after insulation is installed.

7. Valves installed in piping systems with fluids typically less than ambient temperature shall be constructed with all components exposed to atmosphere of stainless steel or brass. Steel components are not acceptable. For valves 3-inches or smaller use stainless steel components with suitable trim on underground valve installations.
8. Stainless steel handles required for exterior applications.
- B. Valve Applications:
 1. Shutoff, Isolation, and Drain Service:
 - a. 2-inches and smaller: Ball valves.
 - b. 2-1/2-inches and larger: Butterfly valves.
 2. Underground, Domestic Water Service:
 - a. 4-inches and larger: PRATT Groundhog Butterfly Valve, no substitutions allowed.
 3. Check Valves: Spring loaded check valves.
 - a. 3-inches and larger: Wafer style with split disc design.
- C. Valve Installation:
 1. Locate valves for easy access and provide separate support where necessary (access doors, chainwheels, etc.). For example, valves located out of reach from a ceiling access door is not considered accessible.
 2. Coordinate access door locations with Architect.
- D. Install shut-off valves at each branch and riser where two or more plumbing fixtures or equipment connections is served. Locate valves close to mains and equipment.
- E. Install shut-off valves at connections, inlets, and outlets to each piece of plumbing equipment.
- F. Install drains, consisting of a tee fitting, 3/4-inch ball valve, and short 3/4"-inch threaded nipple with cap, at low points in piping system mains, base of risers, and elsewhere such that any isolated section of the system can be fully drained.
- G. Install drains at all equipment (including water heaters), located to completely drain equipment for service and repair.
- H. Install valve vaults or boxes, as conditions demand, to provide access to valves installed below grade. Connect vault drain to storm sewer.

22 07 00 PLUMBING INSULATION

- A. Refer to Design Standard 23 07 00 for insulation requirements.
 1. Domestic cold and hot water require insulation, refer to 23 07 19 Piping Insulation for specifications.
 2. HVAC condensate and below ambient drain piping require insulation, refer to 23 07 19 Piping Insulation for specifications.
 3. Storm, rainwater, and overflow drain piping require insulation, refer to 23 07 19 Piping Insulation for specifications.

22 10 00 FACILITY/DOMESTIC WATER

- A. Piping Material:
 1. All materials used in potable water systems shall meet the requirements of NSF/ANSI 14 and NSF/ANSI 61 as applicable.
 2. Domestic Cold and Hot Water, Above Grade:
 - a. 2-inches and smaller, interior:

- (i) Type L copper, hard drawn tubing, ASTM B88 with lead-free Viega ProPress Fitting System or equal with EPDM o-rings.
 - (ii) Type L copper, hard drawn tubing, ASTM B88 with wrought copper fittings per ASME B16.22 and lead-free soldered joints per ASTM B32.
 - (iii) Hot water return piping to be Type K copper.
 - (iv) Exterior above grade piping to be Type K copper.
 - b. 3-inches and larger:
 - (i) Preference for standard weight galvanized steel, ASTM A53, Grade B, Type E or S with standard grooved fittings equal to Victaulic Fittings with EPDM-rubber gaskets.
 - (ii) Type L copper, hard drawn tubing, ASTM B88 with lead-free Viega ProPress Fitting System or equal with EPDM o-rings.
 - (a) No soldered joints for piping 3-inches and larger.
 - 3. Domestic Cold and Hot Water, Under-Building-Slab:
 - a. No piping larger than ¾-inch located under-building-slab unless granted prior approval by SHSU Plant Operations.
 - b. Type K copper, annealed-temper tubing, ASTM B88. No joints installed in inaccessible areas under-building-slab.
 - c. For water service entry, the preferred routing into the building is through an exterior wall. Where approved by SHSU to route water service up through the building slab, pipe should be one-piece stainless steel. No joints installed in inaccessible areas under-building-slab.
 - d. All piping under-building-slab should be sleeved with polybutylene piping sized 2x water pipe diameter. No joints installed in inaccessible areas under-building-slab.
 - e. One-piece stainless steel riser for will be allowed for below grade under slab water supply.
 - 4. Domestic Cold Water, Below Grade within 5-feet of Building:
 - a. 4-inches and smaller: Type K copper, annealed-temper tubing, ASTM B88 with wrought copper fittings per ASME B16.22 and BCuP series brazed joints per AWS A5.8.
 - b. 6-inches and larger:
 - (i) Ductile-iron, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.
 - (ii) Polypropylene plastic, ASTM pipe; molded polypropylene fittings; and heat-fusion joints. Aquatherm Green Pipe or approved equal.
 - c. No cast iron piping.
 - 5. Pipe size limitations include:
 - a. No main distribution piping smaller than ¾-inch. Branch piping to individual fixtures/equipment may be smaller.
 - b. No 2-1/2-inch, 3-1/2-inch, and 5-inch piping.
 - 6. Residence Life Special Requirements:
 - a. PEX-a piping is permissible for piping 3-inches and smaller, indoor or below grade applications only (no exterior or UV-exposed PEX-a piping).
 - b. PEX-a piping, ASTM F876/877 with engineered polymer ASTM F1960 or lead-free brass fittings and cold expansion with PEX reinforcing ring joints.
- B. Pipe Testing Procedures:**
- 1. The following testing procedure is required for domestic water systems. Testing shall also be in accordance with the adopted version of the International Plumbing Code (IPC) and most recent Texas Commission on Environmental Quality (TCEQ) requirements.
 - a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

- b. 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.
 - c. 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.
 - d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for **24-hours**. Leaks and loss in test pressure constitute defects that must be repaired.
 - e. Hydrostatic testing and documentation of test results for polypropylene piping (Aquatherm) to be in accordance with the manufacturer's instructions and submitted to the manufacturer upon successful completion per warranty requirements.
 - f. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
 - g. Prepare reports for tests and for corrective action required to be reviewed by the Owner's Representative.
- C. Pipe Cleaning Procedures:
1. The following cleaning procedure is required for domestic water systems. Cleaning shall also be in accordance with the adopted version of the International Plumbing Code (IPC) and most recent Texas Commission on Environmental Quality (TCEQ) requirements.
 - a. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - b. Use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - (i) Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - (ii) Fill and isolate system according to either of the following:
 - (a) 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.
 - (b) Chlorine should always be diluted with water before introduced to the system.
 - (c) The maximum allowable chlorine content should not exceed 50 ppm or the chlorine resistance of the system piping material(s); whichever is less. Piping damaged due to excessive chlorine content should be replaced by the Contractor.
 - (i) **Expedited cleaning where chlorine content is to exceed 50 ppm requires prior approval by SHSU.**
 - (iii) Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - (iv) Repeat procedures if biological examination shows contamination.
 - (v) Submit water samples in sterile bottles to an independent testing agency and provide report showing acceptable water quality to the Owner's Representative.
 - (a) The contractor is required to include testing for metals like copper that may be present in the water if excessive chlorine concentration has damaged the piping system.
 2. Submittal Requirements:
 - a. Technician(s) resume(s) showing 5-years documented experience with this procedure.
 - b. Testing procedure including total system volume calculation and calculated chlorine content to achieve 50 ppm.

3. Pipe cleaning procedure should be scheduled at least 2-weeks in advance to allow participation by both the project commissioning agent and SHSU.
- D. Piping Specialties:
1. Strainers:
 - 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. Strainer sizes under 2" shall be brass or stainless steel.
 2. Hose Bibbs/Hydrants:
 - a. Do not locate hose bibbs in toilet rooms.
 - b. Recessed Non-Freeze Wall Hydrants: Case-bronze casing, length to suit wall thickness, vacuum breaker, hinged cover, 3/4" inlet, hose outlet. Provide ¼ turn, no key required to open valve or cover.
 - c. Roof hydrants should be non-freeze type with piped drain line. Observe manufacturer recommendations for maximum drain line length.
 - d. Locate a wall or roof hydrant within 50-ft of all outdoor HVAC equipment including air handling units, condensing units, and air-cooled chillers to allow for coil cleaning.
 3. Backflow Prevention Devices:
 - a. Installation of backflow prevention devices shall meet all requirements of the local jurisdiction.
 - b. The PSP shall include in the contract documents a requirement for the Contractor to register all backflow prevention devices with the maintenance and testing service used by the local jurisdiction. The City of Huntsville uses SC Tracking Solutions and the City of Conroe and The Woodlands use Vepo, LLC. The PSP shall verify the correct maintenance and testing service during development of the construction documents.
 - c. The PSP shall evaluate criticality of application to determine if N+1 redundancy is recommended for the backflow prevention device. For example, an education building would require N+1 to avoid water outages during routine maintenance and testing, however, a storage building would not require N+1.
 - d. Shall be of the reduced pressure zone (RPZ) type. The assembly shall include shutoff valves on inlet and outlet, and strainer on inlet, and drain. The preferred RPZ manufacturer is Watts.
 4. Pressure Regulating Valves:
 - a. Provide pressure gauge on valve inlet and outlet.
 5. Water Treatment for Foodservice:
 - a. Install filtration and other water treatment systems as required by the manufacturer of water-using foodservice equipment. Equipment requiring water treatment include but is not limited to ice makers, coffee and espresso equipment, fountain drink machines, steamers and combi-ovens, and dishwashers.
 - b. Pentair Everpure water treatment solutions are preferred.
- E. Domestic Water Pumps:
1. Recommend in-line circulating pumps or close-coupled end suction pumps for low flow circulating systems. Taco and Grundfos.
 2. Water Pressure Booster System:
 - a. PSP to evaluate if booster system is required for project.
 - b. 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.

- c. Provide all booster pumps with a valved bypass line to facilitate maintenance, basis of design
- d. Grundfos bp – Grundfos Model MPC-E 3CRE15-2 480/3/60 Triplex Domestic Booster Package.

22 11 14 FACILITY NATURAL GAS

- A. Provide protective bollards for gas meter installations
- B. For projects requiring EMERGENCY GENERATORS: PSP to coordinate gas service requirements with utility provider. Ensure service sizing is adequate to allow generator to remain operational during building restart.
- C. For FOOD SERVICE FACILITIES: All gas appliances are to be tethered to wall.
- D. Install main shutoff valve downstream of utility meter for SHSU use. Install capped tee with pressure port for pressure testing downstream of main shutoff valve.
- E. Pipe and Pipe Fittings:
 - 1. Above Ground Natural Gas Piping:
 - a. 2-inch piping and smaller: Black steel, Schedule 40, Type E or S, Grade B, malleable-iron threaded fittings, Class 150. Viega MegaPress fittings are allowed for piping up to 4-inches.
 - b. 2-1/2-inch piping and larger: Black steel, Schedule 40, Type E or S, Grade B, wrought-steel welded fittings. Viega MegaPress fittings are allowed for piping up to 4-inches.
 - 2. Underground Natural Gas Piping: HDPE, fusion welded. TRACER WIRE IS REQUIRED FOR ALL UNDERGROUND PIPING.
 - 3. No pipe smaller than 3/4", except as detailed for laboratory furniture, shall be used. From the emergency shutoff valve to the outlets, the pipe shall be assembled with threaded fittings provided all joints are exposed or within the confines of the laboratory furniture.
 - 4. Flanges:
 - a. In all instances in which flanges are required for the installation of flanged fittings for gas lines, the Contractor shall provide Crane or Walworth weld neck pattern, Class 150 forged steel flanges.
 - 5. Exterior gas piping shall be painted with rust-inhibiting paint and labeled.
 - 6. Interior gas piping and piping accessories shall be painted safety yellow and labeled with utility name and direction of flow arrow.
 - 7. Exterior pipe anchors and supports shall be stainless steel.
- F. Manual Gas Shutoff Valves:
 - 1. Ball valve 2-inches and smaller: Two-piece, full-port, bronze valve with bronze trim, threaded ends, blowout proof stem and seats, locking feature, 125-psig pressure class, suitable for natural-gas service with "WOG" indicated on valve body.
 - 2. Plug valve 2-inches and smaller: Bronze body with bronze straightway plug, threaded ends, square or flat head operator, 125-psig pressure class, suitable for natural-gas service with "WOG" indicated on valve body.
 - 3. Gas Cocks 2" and smaller shall be AGA approved 150 PSI non-shock WOG, bronze straightway cock, flat or square head with threaded ends.
 - 4. Ball valve 2-1/2-inches and larger: Two-piece, full-port, bronze valve with bronze trim, threaded ends, blowout proof stem and seats, locking feature, 125-psig pressure class, suitable for natural-gas service with "WOG" indicated on valve body.

5. Plug valve 2-1/2-inches and larger: Cast-iron body with bronze straightway plug, flanged ends, square or flat head operator, 125-psig pressure class, suitable for natural-gas service with “WOG” indicated on valve body.
 6. Gas cocks 2-1/2” and larger shall be AGA approved 125 PSI non-shock WOG, iron body bronze mounted, straightway cock, square head with flanged ends.
 7. PE Ball Valves: PE body and ball, acetal stem, nitrile seats and seals, fusible ends to match piping, CWP rating of 80-psig, nut or flat head operator.
 8. Control station shall be pushbutton station mounted in 2-gang box, one normally open key operated contact, and one normally closed pushbutton operated contact. Faceplate shall be inscribed with “Gas Valve Control” on top, “Open” over keyhole, and “Closed” over pushbutton.
 9. Provide zone valves on each floor easily accessible for maintenance personnel for isolation and testing.
 10. Near the point at which each outgoing line leaves the gas header, the Contractor shall install an AGA gas stop valve or gas cock. These wrench operated valves shall each be provided with an appropriate wrench. Cocks of the same type shall be installed at each point indicated on the Drawings.
 11. Provide ball valves for shut-off and to isolate equipment, part of systems, and vertical risers.
 12. Provide gas valves located in occupied spaces (labs, etc.) with positive lock devices. Review locations with SHSU during design.
- G. Pressure Regulators:
1. Single-stage and suitable for natural gas.
 2. Steel jacketing and corrosion-resistant components.
 3. Elevation compensator.
 4. End connections: Threaded for regulators 2-inches and smaller, flanged for regulators 2-1/2-inch and larger.
 5. Atmospheric vent to outdoors, full size of outlet, terminated in a weather-proof hood.
 6. Size for required inlet and outlet gas pressures, specific gravity, and volume flow. Provide gas shutoff valve upstream of each pressure regulating valve.
 7. Basis of design: American Meter 1800C series.
- H. Testing:
1. Natural gas piping shall be tested in accordance with International Fuel Gas Code requirements.
 2. SHSU REQUIRES A 4 HOUR TEST WITH A CERTIFIED DIAPHRAGM GAUGE. LOW PRESSURE = 7 PSI. HIGH PRESSURE = 1 ½ TIMES OPERATING PRESSURE.

22 13 00 SANITARY SEWAGE

A. Piping Materials:

1. Above Ground Drainage and Vent Pipe and Fittings
 - a. Heavy Duty Couplings for Hubless Cast-Iron Soil Pipe: Hubless Clamps, heavy weight, stainless steel bands. Clamps shall be constructed and tested per ASTM C-1277. For pipe sizes 1-1/2” through 4” minimum four (4) bands and for pipe sizes 5” through 15” minimum six (6) bands.
 - b. Install restraints on no hub bands 4” and larger per manufacturer’s instructions.
 - c. No cast iron in Residence Life Buildings. Schedule 40 PVC only.
2. Underground Drain Pipe And Fittings
 - a. Cast-Iron Soil Pipe: ASTM A74, Service weight, hub-and-spigot soil pipe and fittings
 - b. Neoprene Compression Gaskets: ASTM C564.

- c. Sewer Pipe and Fittings: Conform to ASTM D2729 for pipe and fittings.
 - d. No cast iron in Residence Life Buildings. Schedule 40 PVC only.
 3. Do not install backwater valves in sanitary building drain piping.
 4. Sanitary piping shall not have any reductions in size from the point of inlet connection.
- B. Cleanouts:
1. Interior Cleanouts:
 - a. Wall Cleanouts: Cast-iron body adaptable to pipe with cast-bronze or brass cleanout plug; stainless steel cover including screws.
 - b. Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1, countersunk head.
 - c. Extend cleanouts to finished floor or wall surface, with access covers installed flush to the finished surface. Ensure clearance at cleanout for rodding of drainage system.
 - d. Install interior cleanouts above the flood rim (i.e. no floor cleanouts) unless granted prior approval by SHSU.
 - e. Install interior cleanouts at the end of all sanitary piping branches.
 - f. Coordinate cleanout locations with Architect.
 2. Exterior Cleanouts:
 - a. Floor Cleanouts: Two-way, cast-iron body and frame, with cleanout plug and adjustable round nickel bronze top.
 - b. Encase exterior cleanouts in concrete with metal access cover installed flush with grade. Plastic access covers are not allowed.
 - c. Install exterior cleanouts in a suitable location for ease of maintenance and cleanup.
 - d. Install exterior cleanouts in accordance with the International Plumbing Code and, at a minimum, at every change in horizontal direction greater than a 1/8 bend elbow (45-degrees) and with a maximum distance of 75-ft between cleanouts.
 3. Residence Life Special Requirements:
 - a. Cleanout Plugs: PVC only.
 - b. Locate all cleanouts to exterior of building except for cleanouts for lavatory and kitchen sinks as outlined below.
 - c. Install exterior cleanouts in accordance with the International Plumbing Code and, at a minimum, at every change in horizontal direction greater than a 1/8 bend elbow (45-degrees) and with a maximum distance of 90-ft between cleanouts.
 - d. Install interior wall cleanouts for each lavatory and kitchen sink located above the flood rim and countertop (where applicable). Cleanout plug should be flush with the wall so a mirror or access cover can be mounted.
- C. Floor Drains:
1. Provide floor drains in all toilet rooms, janitor closets, and mechanical rooms.
 2. Provide deep seal "P" traps at all floor drains.
 3. There shall be adequate floor drains to provide drain for all equipment requiring same; one per piece of equipment, to eliminate excessive drain piping across floors.
 4. Floor Drain (corridors): Stainless steel body with flashing collar, ty-seal or caulked outlet and adjustable strainer head, stainless steel round strainer with satin finish.
 5. Floor Drain (mechanical rooms, storage rooms and other remote areas) shall be provided with a central piped primer system which automatically primes traps building wide using a single timed valve for one minute every 24 hours (adjustable).
 - a. Gravity fed trap primers are preferred.

- b. Mechanical type trap primers should be approved by SHSU and should be located to allow easy access for maintenance and inspection.
- c. Trap guards are not allowed.
- 6. At all floor drain locations, flood test shall be required (to be witnessed by SHSU Plumbing Services).
- 7. Coordinate drain locations and elevations with project architect.
- D. Roof Drains:
 - 1. Roof Drain (General Purpose): Cast-iron body with combined flashing collar and cast- iron or brass dome.
- E. TESTING
 - 1. NO PIPING, FITTINGS SHALL BE COVERED BEFORE INSPECTION AND TESTING
 - 2. TESTING REQUIRES 10 FT OF HEAD FOR 4 HOURS

22 30 00 PLUMBING EQUIPMENT

22 30 00 DOMESTIC WATER HEATERS

- A. Water Heaters:
 - 1. Preferred Manufacturers:
 - 2. A.O. Smith (all SHSU projects)
 - 3. State (all SHSU projects)
 - 4. Raypak/Rheem (Resident Life only)
 - 5. Resident Life Design Requests:
 - a. Preferred size is 199,000-BTU with N+1 redundancy. PSP should verify sizing for specific design.

22 35 00 DOMESTIC WATER HEAT EXCHANGERS

- A. Preferred Manufacturers:
 - 1. Aerco.
 - 2. Patterson-Kelley.
 - 3. Viessmann.
 - 4. SHSU approved equal.
- B. System Description: A factory packaged water-to-water indirect domestic hot water system that consists of a brazed plate heat exchanger designed and manufactured in accordance with ASME Code Section VIII, Div. 1 and rated for not less than 150-psig on the service water side and not less than the working pressure of the hydronic boiler system (minimum 150-psig, 250 deg. F). The heat exchanger package should be designed to provide instantaneous domestic hot water without the use of storage tanks.
- C. Materials:
 - 1. Heat Exchanger: Type 316 stainless steel plates, copper brazing material, counter-flow arrangement, and double-wall construction.
 - 2. Cabinet/Structural Base: 16-gauge carbon steel (or aluminum sheet metal) with powder coat finish.
- D. System Controls: 3-way electronic control valve, domestic water recirculation pump, and control panel with the following displayed: domestic water supply temperature, domestic water temperature setpoint, high temperature limit, and alarm condition.

- E. System Accessories: Y-strainers with blowdown valves for hydronic and domestic water, hydronic water strainer differential pressure gauge, T&P relief valve, isolation valves, domestic water drain valve, and domestic water air vent.

22 40 00 PLUMBING FIXTURES

- A. All plumbing fixtures to be commercial grade.
- B. Install shut-off valves at connections to each plumbing fixture.
- C. Water Closets:
1. Preferred Manufacturers:
 - a. American Standard.
 - b. Kohler.
 - c. Sloan.
 2. Bowl: Wall or floor mounted, blowout with 3-bolt mounting pattern or siphon jet with 4-bolt mounting pattern, white vitreous china closet bowl, elongated rim, 1-1/2" top spud, china bolt caps.
 3. Toilet Seat: Commercial, elongated rim, open front without cover, shaped to match bowl, check hinge, white, solid-plastic with antimicrobial agent formed into plastic.
 4. Flush Valves:
 - a. Preferred Manufacturers: Sloan only.
 - b. Women's Restroom: 1.6/1.1-gpf, polished chrome, fixture connection top spud, dual flush, battery powered, exposed infrared sensor, diaphragm type, 1-inch screwdriver angle stop with free spinning vandal resistant stop cap, vacuum breaker.
 - c. Men's Restroom: 1.28-gpf, polished chrome, fixture connection top spud, single flush, battery powered, exposed infrared sensor, diaphragm type, 1-inch screwdriver angle stop with free spinning vandal resistant stop cap, vacuum breaker.
 - d. No manual or concealed flush valves unless approved by SHSU.
 - (i) Where manual flush valves are approved by SHSU, mount ADA compliant flush valve handle to wide-side of toilet stall or room.
 5. Resident Life Requirements:
 - a. Preferred Manufacturers: American Standard only.
 - b. Bowl: Floor mounted, gravity tank, 1.28-gpf, antimicrobial surface, white vitreous china, chrome trip lever, china bolt caps.
 - (i) Gravity flush for new dorms to reduce flushing noise.
 - (ii) Provide waste outlet seal ring on all toilets. Waste outlet seal ring material as recommended by fixture manufacturer.
 - (iii) Provide with PVC total knockout flange with stainless steel flange ring equal to Sioux Chief 884-PTM.
 - (iv) Offset flanges are not allowed.
 - c. Toilet Seat: Commercial, elongated rim, closed front with cover, shaped to match bowl, check hinge, white, solid-plastic with antimicrobial agent formed into plastic.
 - d. Supply Fittings:
 - (i) Supply Piping: 1/2-inch flexible braided stainless steel, 12-inches long. Include chrome-plated wall flange.
 - (ii) Angle Stops: Chrome-plated commercial quarter-turn brass ball valve with convertible loose key handle with 1/2-inch inlet and 1/2-inch O.D., McGuire Model LFBV2-10.
- D. Urinals:

1. Preferred Manufacturers:
 - a. American Standard.
 - b. Kohler.
 - c. Sloan.
 2. Fixture: Wall mounted, white vitreous china, 3/4" top spud.
 - a. Floor mounted urinals are not allowed.
 - b. Troughs are not allowed.
 - c. Waterless urinals are not allowed.
 3. Flush Valves:
 - a. Preferred Manufacturers: Sloan only.
 - b. 0.5-gpf, polished chrome, fixture connection top spud, single flush, battery powered, exposed infrared sensor, diaphragm type, 3/4-inch screwdriver angle stop with free spinning vandal resistant stop cap, vacuum breaker.
 - c. No manual or concealed flush valves unless approved by SHSU.
- E. Lavatories:
1. Faucet:
 - a. Manual Faucet: ADA compliant, polished chrome plated cast brass, 4-inch center set, 4-inch spout with chrome-plated constant flow control 0.35-gpm aerator, single-wing handles indexed "HOT" and "COLD", and 1-1/2-inch waste with grid drain strainer.
 - (i) Preferred Manufacturers:
 - (a) Dual lever with quarter turn repairable disc, Chicago Faucet 802-317CP.
 - (b) Resident Life requires Symmons Model S-20-0; PO plugs to be chrome plated brass grid strainer with IPS option.
 - b. Touchless Faucet: ADA compliant, polished chrome plated cast brass, 4-inch center set trim plate, 5-inch spout with chrome-plated pressure compensating flow control 0.35-gpm aerator, and 1-1/2-inch waste with grid drain strainer. Faucet to be battery-powered sensor-operated for tempered hot and cold water with under sink mounted control module.
 2. Supply Fittings:
 - a. Supply Piping: 3/8-inch flexible braided stainless steel, 12-inches long. Include chrome-plated wall flange.
 - b. Angle Stops: Chrome-plated commercial quarter-turn brass ball valve with convertible loose key handle with 1/2-inch inlet and 3/8-inch O.D.
 - (i) Resident Life requires McGuire Model LFBV2-09.
 3. Traps: Cast brass, polished chrome, 1-1/4-inch adjustable p-trap with cleanout plug and waste to wall.
 - a. Resident Life requires p-trap without cleanout plug.
 4. Under sink Safety Covers for ADA Accessibility Compliance: Molded vinyl, impact-resistant, stain-resistant, antimicrobial lavatory p-trap and angle stop assembly safety covers secured with snap-clip flush fasteners.
- F. Kitchen Sinks:
1. Faucet:
 - a. Resident Life requires cast brass 8.5-inch-long swivel spout with metal lever handle less hand spray with metal escutcheon plate, ceramic disc valve cartridge, and 1/2-inch male inlet shanks. American Standard Model 4175.500.
 2. Supply Fittings:

- a. Supply Piping: 3/8-inch flexible braided stainless steel, 12-inches long. Include chrome-plated wall flange.
 - b. Angle Stops: Chrome-plated commercial quarter-turn brass ball valve with convertible loose key handle with 1/2-inch inlet and 3/8-inch O.D.
 - (i) Resident Life requires McGuire Model LFBV2-09.
 3. Garbage disposals are not allowed in Resident Life buildings.
- G. Service/Mop Sinks:
1. Faucet:
 - a. Resident Life requires cast brass, metal lever handles with hot and cold indicators and vandal resistant screws, quarter turn ceramic disc valve cartridges, vacuum breaker, integral supply stops, 6-inch spout top braced to wall with bucket hook and threaded hose end. American Standard Model 4175.500.
 2. Traps: Cast brass, 1-1/2-inch adjustable p-trap with cleanout plug and waste to wall.
 - a. Resident Life requires p-trap without cleanout plug.
- H. Showers/Bathtubs:
1. Shower Valve:
 - a. Resident Life requires Symmons Model 9601-PLR.
 2. Shower/Bathtub Valve:
 - a. Resident Life requires Symmons Model 9602-PLR.
 3. Shower Head:
 - a. Resident Life requires Kosdo Airjet Model KSAJ-150 shower head. Maximum 2.0-gpm, polished chrome finish.
 4. ADA Hand Shower System:
 - a. Resident Life requires Symmons Model 9603-PLR hand shower system with Kosdo Airjet Model KSAJ-150 shower head. Maximum 1.25-gpm, polished chrome finish.
 5. Bathtub Waste and Overflow Fittings: Concealed lever operated pop-up bathtub waste and overflow; chrome plated waste spud with universal type outlet connection suitable for 1-1/2-inch IPS or 1- 1/2-inch OD tubing or 1-1/2-inch solder-joint outlet connection on waste tee.
 - a. Resident Life requires heavy duty lift and turn drain stopper assembly.
- I. Electric Water Cooler/Bottle Filler:
1. Preferred Manufacturer: Elkay.
 2. ADA compliant, wall-mounted, bi-level, dual faucet water cooler with bottle filler. Provide with manufacturer installed water filter.
- J. Wash Down Hose Station: For Hot and cold-water service, thermostatically controlled mixing valve with dial-in temperature setting, temperature limit stop and temperature gauge.