

**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 3/4-inch located under-building-slab unless granted prior approval by the 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 Type K copper.



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 1/4 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

5. Plug valve 2-1/2-inches and larger: Cast-iron 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 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, o-rings 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, "On" over keyhole, and "Closed" over pushbutton.
 9. Provide zone valves on each floor easily accessible to 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-tight 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, (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 pressure, 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.

- 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 bTw{ Tc.0003 Tw{a Tc.ET6 p)TJ19.6667 0 TD.0009 Tc.0005 Tw{t for)5.5(clea1(eaTj/TT2 1 Tf.8

- 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 NA Water Heater. PSP should verify sizing for specific
 - 2. Preferred Manufacturer4 and cAerco.1 Tft11 1 Tf.7541 0 TD0 Tc()T

- 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.



- 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.