Division 22 – Plumbing

22 00 00 Plumbing General Requirements

1. Products and materials manufactured in the United States are preferred.
2. The A/E may specify a single manufacturer and model number to establish a basis of design, however, all specifications shall be open to equal manufacturers or vendors. Where a basis of design specification is indicated, provide at least three other qualified manufacturers or vendors.

22 05 16 Expansion Fittings and Loops for Plumbing Piping

1. Copper Tube Applications: Telescoping housing and guides with fully enclosed stainless steel bellows for compensation of axial expansion of copper tubing for hot water systems and similar system subject to differential temperatures.
    - Bellows: Laminated ASTM A 240 Type 321 stainless steel.
    - End connections: ASTM B 88 copper tube male or female tube ends for sweat solder connection.
    - Housing and Guides: ASTM A 240 Type 304 stainless steel. Rated for 3 inches axial compression and 0.5 inch extension.
2. Install Victaulic in-line expansion joints in water piping systems that are installed in enclosures where pipe bends or loops cannot be applied:
    - 2" through 6" sizes: Packless, gasketed, slip-type expansion joint with grooved end telescoping body, for installation with Style 07 rigid couplings, providing up to 3" axial end movement with pressure rating up to 350 psi. Victaulic Style 150 Mover®.
    - 3/4" and larger sizes: Combination of grooved end short nipples and Style 75 or 77 flexible couplings joined in tandem to provide increased expansion. Joint movement and expansion capabilities determined by number of couplings/nipples used in the joint. Pressure rating dependent on size and style of flexible couplings used. Victaulic Style 155.

22 05 17 Sleeves and Sleeve Seals for Plumbing Piping

1. Do not use sheet metal sleeves through outside walls. Sleeves shall be pipe conforming to ASTM A 120. At outside walls provide "leak plate" and install "Linkseal".

22 05 19 Meters and Gages

1. Pressure Gauges: Direct-Mounted, Metal-Case, Dial-Type Pressure Gages: ASME B40.100. Liquid-filled case, cast aluminum, 4-1/2-inch nominal diameter. Bourdon tube pressure element. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type or back-outlet type. Movement: Mechanical, with link to pressure element and connection to pointer. Dial: Non-reflective aluminum with permanently etched scale markings graduated in psi and kPa. Pointer: Dark-colored metal. Window: Plastic. Ring: Stainless steel. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range. Scale Range for Water Service Piping: 0 to 100 psi.

    Snubbers: ASME B40.100, brass; with NPS 1/4 ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

    Isolation Valves: Brass ball with NPS 1/4 (DN 8) ASME B1.20.1 pipe threads.
2. Thermometers: Cast aluminum, liquid-in-glass: ASME B40.200, 7-inch nominal size aluminum case with adjustable angle mount. Glass tube with magnifying lens and blue or red organic liquid. Non-

reflective aluminum background with etched scale markings graduated in ºF and ºC. Plastic window. Aluminum, brass or stainless steel stem. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range. Connector: 1-1/4 inches, with ASME B1.1 screw threads. Scale Range for Domestic Hot-Water Piping: 0 to 250 ºF.

3. Direct-Mounted, Light-Activated Thermometers: ASME B40.200. Metal case, 7-inch nominal size with adjustable angle mount. Glass passivated thermistor. Digital LCD display in ºF and ºC (selectable). Aluminum stem. Accuracy: Plus or minus 2 ºF (1 ºC). Connector: 1-1/4 inches, with ASME B1.1 screw threads.
4. Thermowells: Standard: ASME B40.200. Pressure-tight, socket-type fitting made for insertion into piping tee fitting. Brass construction. Stepped shank. External Threads: NPS 1/2, NPS 3/4, or NPS 1,) ASME B1.20.1 pipe threads. Internal Threads: 1-1/4 inches, with ASME B1.1 screw threads. Bore: Diameter required to match thermometer bulb or stem. Insertion Length: Length required to match thermometer bulb or stem. Lagging Extension: Include on thermowells for insulated piping and tubing. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

22 05 53 Identification for Plumbing Piping and Equipment

1. Utilize standard tag or placard to mark all major equipment. Tag all valves and provide valve chart for each floor.
2. Utilize standard Commonwealth of Virginia color coding for various building service piping and equipment. Mark each with name of service, direction of flow, and associated unit served where appropriate.
3. Equipment requiring electrical power shall be provided with a label indicating the electrical panel and/or motor controller feeding the equipment.
4. Plastic labels for equipment shall be multi-layer, multi-color phenolic with contact-type permanent adhesive compatible with attached substrate. Labels shall be 1/16” thick with white lettering over black background.
5. Equipment labels shall include the equipment’s name and unique drawing designation or schedule tag number.
6. Provide pre-coiled, semi-rigid labels to cover full circumference of pipe. Pressure-sensitive type markers are not acceptable.
7. Valves shall be tagged with stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers. 1 ½” diameter disk with smooth edges.
8. Valve tag material shall be brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware. Brass wire-link or beaded chain or S-hook.
9. Unless specified otherwise, comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

22 07 00 Plumbing Insulation

1. All insulation shall conform to Energy Code requirements.
2. Staples are not acceptable for insulation installation.
3. All "raw" ends of insulation shall be sealed.
4. Insulation specification shall describe what systems and services are to be insulated.
5. Condensate drains shall have 1" of insulation.

22 11 16 Domestic Water Piping

1. Domestic water service, below grade, 3 inch and smaller:
    - Seamless copper water tube, Type K, ASTM B 88 with ASME B16.18 cast-copper alloy or ASME B16.22 wrought copper solder joint fittings.
    - Copper brazed joints, AWS A5.8 BCuP series.
    - Cast copper alloy unions, hexagonal stock with ball and socket solder ends, ASME B16.18.
2. Domestic water service, below grade, 4 inch and larger:
    - Cement lined ductile iron, Class 52, AWWA C 151.
    - Mechanical joint, ductile iron fittings, AWWA C 110, ductile or gray iron standard pattern or AWWA C 153 ductile iron compact pattern.
    - AWWA C 111 rubber gaskets. ANSI Class 150 flanges.
3. Water service flexible joints: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts. 250 psig pressure rating. Pressure containing parts shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213 and shall be factory holiday tested with a 1500 volt spark test. Flexible expansion joint shall have flanged connections conforming to ANSI/AWWA A21.11/C110. Bolts and nuts shall be 316 stainless steel and gaskets shall be neoprene. Equal to EBAA Iron, Inc
4. Domestic water, above grade:
    - Seamless copper water tube, drawn temper, Type L, ASTM B 88.
    - Fittings and joints for 2 1/2" and smaller shall be solder joint wrought copper, ASME B16.22
    - Viega ProPress system with EPDM seal may be used in lieu of solder joints 2 1/2" and smaller.
    - Fittings and joints for 3" and larger shall be ductile iron coupling with copper alkyd enamel paint coating, ASTM A-536. Grade "E" EPDM elastomer gasket, ASTM D-2000. Equal to Victaulic Style 606 coupling. ASTM B-75 copper alloy fittings.
    - ASTM B-584 grooved end cast bronze fittings for 6" pipe size.
5. Soldered joints shall be ASTM B-32 solder filler material, Alloy Sb5 "95/5." Use ASTM B-813 liquid or paste flux. Soldering procedures shall comply with ASTM B-828.
6. Unions shall be cast copper alloy, hexagonal stock with ball-and-socket joint, solder joint ends. ASME B16.18.
7. Flanges shall be ANSI Class 150 flange adapter equal to Victaulic Style 641 for connections to flanged equipment. ANSI B16.1 dimensions.
8. All domestic hot water recirculating systems shall be provided with balancing valves for each zone. Specifications shall require testing, adjusting and balancing of each domestic hot water recirculating zone by a certified TAB contractor. Coordinate with Division 23 specifications.
9. Domestic water systems shall be cleaned and disinfected in accordance with the authority having jurisdiction (AHJ). A water treatment specialist shall be utilized to prepare a cleaning and disinfection plan which shall include detailed procedures; to supervise all cleaning and disinfection activities on site; and furnish all required cleaning and disinfecting chemicals. A written report for each system shall be provided by the water treatment specialist, certifying that each system has been cleaned and

disinfected in accordance with the AHJ and the written cleaning and flushing plan. The water treatment specialist shall be responsible for testing the water quality of each system during the cleaning and disinfection process. The reports shall include all water sample test reports.

22 13 16 Sanitary Waste and Vent Piping

1. Do not use plastic pipe materials above ground.
2. Sanitary Waste and Vent, Below Grade: Hub-and-spigot, cast-iron soil pipe and fittings.
    - Pipe: ASTM A 74, Service weight.
    - Fittings: ASTM A 74, Service weight, DWV pattern.
    - Gaskets: ASTM C 564, rubber.
3. Sanitary Waste and Vent, Above Grade: Hubless cast iron soil pipe and fittings.
    - Pipe: ASTM A888 (CISPI 301), Service weight
    - Fittings: ASTM A888 (CISPI 301), Service weight, DWV pattern.
    - Couplings: ASTM C1540 Heavy duty shielded no-hub coupling. ASTM C564 gasket. Bearing FM 1680 Approval Mark.
4. Galvanized Steel Pipe and Fittings (Sanitary Vent only)
    - Pipe: ASTM A 53/A 53M, Type E or S, Grade A or B, Standard Weight or Schedule 40, galvanized. Include ends matching joining method.
    - Fittings: ASME B16.12, galvanized, threaded, cast-iron drainage pattern.
5. Copper Tube and Fittings (Sanitary Waste and Vent)
    - Tube: ASTM B 88, Type L, copper water tube, drawn temper.
    - Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.
6. Sanitary Waste and Storm Drainage, Force Main: Galvanized Steel Pipe and Fittings
    - Pipe: ASTM A 53/A 53M, Type E or S, Grade A or B, Standard Weight or Schedule 40, galvanized. Include ends matching joining method.
    - Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized, seamless steel pipe. Include ends matching joining method.
    - Unions: ASME B16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
    - Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.
    - Flanges: ASME B16.1, Class 125.
    - Flanged Fittings: ASME B16.1, Class 125 galvanized.
    - Grooved-End, Steel-Piping Fittings: ASTM A 47/A 47M, galvanized, malleable-iron casting; ASTM A 106, galvanized-steel pipe; or ASTM A 536, galvanized, ductile-iron casting; with dimensions matching steel pipe.
    - Grooved-End, Steel-Piping Couplings: AWWA C606, for steel-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.
    - Gate Valves: Iron gate valve, Class 125, NRS.
    - Check Valves: Iron swing check valve, Class 125, non-slam design.
7. Encase all cleanouts and valve boxes located in lawn areas in a 1’ x 1’ x 6” concrete pad.

22 14 13 Storm Drainage Piping

1. Do not use plastic pipe materials above ground.
2. Storm Drainage, Below Grade: Hub-and-spigot, cast-iron soil pipe and fittings.
    - Pipe: ASTM A 74, Service weight.
    - Fittings: ASTM A 74, Service weight, DWV pattern.
    - Gaskets: ASTM C 564, rubber.
3. Storm Drainage, Above Grade: Hubless cast iron soil pipe and fittings.
    - Pipe: ASTM A888 (CISPI 301), Service weight
    - Fittings: ASTM A888 (CISPI 301), Service weight, DWV pattern.
    - Couplings: ASTM C1540 Heavy duty shielded no-hub coupling. ASTM C564 gasket. Bearing FM 1680 Approval Mark.
4. Storm Drainage, Force Main: Galvanized Steel Pipe and Fittings
    - Pipe: ASTM A 53/A 53M, Type E or S, Grade A or B, Standard Weight or Schedule 40, galvanized. Include ends matching joining method.
    - Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized, seamless steel pipe. Include ends matching joining method.
    - Unions: ASME B16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
    - Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.
    - Flanges: ASME B16.1, Class 125.
    - Flanged Fittings: ASME B16.1, Class 125 galvanized.
    - Grooved-End, Steel-Piping Fittings: ASTM A 47/A 47M, galvanized, malleable-iron casting; ASTM A 106, galvanized-steel pipe; or ASTM A 536, galvanized, ductile-iron casting; with dimensions matching steel pipe.
    - Grooved-End, Steel-Piping Couplings: AWWA C606, for steel-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.
    - Gate Valves: Iron gate valve, Class 125, NRS.
    - Check Valves: Iron swing check valve, Class 125, non-slam design.
5. Encase all cleanouts located in lawn areas in a 1’ x 1’ x 6” concrete pad.

22 14 29 Sump Pumps

1. Drain openings with flood level rims that are located below the crown level of the exterior storm sewer shall be pumped. Pump systems serving subsoil/underslab drainage, critical applications, or any application serving more than one drain or multiple areas shall be provided with not less than two pumps for N+1 redundancy, and shall be on building standby power.
2. Sump pumps shall be commercial grade, submersible type, and provided with lift rail, lead-lag-alternate controls, and designed to preclude single point failure.
3. Sump pumps shall be capable of passing not less than 1/2 inch diameter solids.
4. Basins shall be industrial grade plastic sump of either high density polypropylene or fiberglass construction.

5. Elevator pit sump pumps shall be of an oil-preclusion type except that standard sump pumps may be used for electric traction elevators with no hydraulic oil lines.
6. Elevator pit sump pumps shall have a discharge capacity of 3000 gallons per hour (50 gpm) minimum.
7. The pump shall include a high water/general fault alarm to the monitored building automation system.
8. The discharge from elevator pit drains and elevator sump pumps shall spill indirectly to the sanitary drainage system though an air break into a hub drain or floor sink that is located in a mechanical room or similar approved location.

22 35 00 Domestic Water Heat Exchangers

1. Water heaters generally should be heated with HTHW when central heating systems are available. Check with GMU for specific requirements. Use 2-way, cast steel control valves as approved by GMU.
2. Preferred manufacturers include AERCO, Ace Boiler, Chemline, and Patterson-Kelly. GMU will not accept PVI as a manufacturer.
3. All water heaters shall comply with ASME Boiler and Pressure Vessel Code and shall be stamped with appropriate code symbols.
4. Oil fired water heaters shall be used only with GMU's approval.
5. HTHW - Control valve should be on the supply side for better temperature control.
6. Water heaters shall be semi-instantaneous type with pneumatically actuated control valves, with temperature control accurate over entire flow range within plus or minus 4°F.
7. Electric, oil, or gas-fired low volume storage tank type heaters may be employed only for special applications as approved by GMU, such as where HTHW is not otherwise available for the facility.
8. Double wall heat exchangers shall be provided for potable systems, single wall is acceptable for non-potable systems.
9. Heaters shall be sized and arranged to provide N+1 redundancy for the total design load.
10. HTHW supply to heaters shall be sized for full demand plus 20% allowable for future growth.
11. Hot water shall be heated to 144°F and tempered down to 124°F or general distribution by an ASSE 1017 master thermostatic mixing valve.
12. Distribution shall provide 140°F hot water for food preparation kitchens, utility fixtures, and where otherwise required.
13. Point-of use booster heaters at commercial kitchen dishwashers shall be used where water temperature above 140°F is required.
14. Point of use instantaneous water heaters is not an acceptable substitution for connection to the hot water supply and return system.
15. Hot water systems shall not use gaskets, seals or components constructed of natural rubber, which often serves as nutrient to bacteria.
16. Hot water system shall be provided with mechanical pumped circulation to maintain distribution temperatures.
17. Dead-legs shall be kept to a minimum.
18. Large water storage tanks shall be avoided in potable systems.
19. Valves and components shall be suitable for normal working temperature of 176°F to allow for systems sanitization.

20. Hot water outlet temperature shall be controlled by properly adjusted limit stops at point of use control faucets/mixing valves as required by the plumbing code.

22 40 00 Plumbing Fixtures

1. Provide fixtures that comply with the requirements of our Energy Savings Performance Contract (ESPC).
2. All plumbing fixtures must be tight fitting to walls and be neatly sealed at joint with silicone sealant.
3. Specify flushometer valve repair kits equal to 10 percent of the quantity of each type of flushometer valve installed, but no fewer than 6 of each type.
4. Specify faucet washers, cartridges and o-rings equal to 10 percent of the amount of each type and model installed, but no fewer than 6 of each type.
5. Repair parts and materials shall be factory packaged and sealed with protective covering for storage and labeled to describe the contents to cross reference to parts lists in operation and maintenance manuals.
6. Vitreous china fixtures shall be manufacturers' standard white color unless approved otherwise.
7. Faucets, flush valves, exposed fixture stops and supplies shall be polished chrome plated finish.
8. Toilets in all applications shall be 1.28 gallon per flush fixtures.
9. Urinals in all applications shall be 0.125 gallon per flush fixtures. Waterless urinals are prohibited.
10. Lavatory faucets in residential applications shall be 2.2 gallon per minute.
11. Lavatory faucets in non-residential applications shall be 0.25 gallon per minute.
12. Showers in all applications shall be 1.5 gallons per minute.
13. Supplies, Traps and Accessories
14. Supplies and Shut-Offs: Chrome plated brass stops with full turn brass stem and loose-key handle. Chrome plated escutcheon. Sweat by compression connections. Chrome plated copper supplies. Flexible elastomeric supplies are prohibited.
15. Tailpieces, Traps and Waste Arms:

    Exposed: Chromium plated cast brass with nipple and set screw escutcheons.

    Concealed: Rough cast brass or same material as pipe connected.

    Slip joints not permitted on sewer side of trap.

    Traps shall correspond to fittings on cast iron soil pipe or steel pipe respectively, and size shall be as required by connected service or fixture. Minimum trap seal shall be 2 inches.

    Provide offset tailpieces for ADA configured sinks.

16. Strainers

    Public Lavatories: Cast brass chrome plated flat grid strainer with 1 ½" x 4" 17 gauge seamless brass tailpiece, cast brass lock and coupling nut.

    Residential Lavatories: Cast brass pop up drain plug with cast brass follower. 1 1/4" x 4" 17 gauge seamless brass tailpiece, cast brass lock and coupling nut.

    Sinks: Heavy duty forged stainless steel basket strainer with 1 ½" x 4" seamless brass tailpiece, die cast clip and lock nuts.

17. Toilet Seats
18. In general, install toilet seats of the same manufacturer as the water closet fixture. An approved alternate manufacturer may be installed.

19. Description: Toilet seat for water-closet-type fixture.

    Material: Molded, solid plastic with antimicrobial agent.

    Configuration: Open front without cover for public applications. Open front with cover for residential applications.

    Size: Elongated.

    Hinge Type: SC, self-sustaining, check.

    Class: Standard commercial.

    Color: White.

20. Protective Shielding Pipe Covers: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

21. Water-Closet Supports: Combination adjustable carrier designed for accessible or standard mounting height of wall-mounting, water-closet-type fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

22. Urinal Supports: Urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture for wall-mounting, urinal-type fixture. Include steel uprights with feet.

23. Lavatory Supports: Lavatory carrier with concealed arms and tie rod for wall-mounting, lavatory-type fixture. Include steel uprights with feet. For accessible-fixture support, include rectangular steel uprights.

24. Water closets in public applications shall be wall mounted, vitreous china, 1.28 gallon per flush, siphon jet type, with electronic hands-free flushometer, battery powered. The use of manual flushometers for public fixtures is generally discouraged, but may be approved on a case-by-case basis for non-public, non-food service areas. Configuration shall include elongated bowl and top spud flushometer connection.

25. The use of flushometers that provide dual flush volume on water closets that are designed for 1.6 GPF is NOT acceptable due to potential compromise of the trap seal under varying flush conditions, and also due to increased stoppage potential due to the reduced water volume and hydraulic depth for waste transport in the downstream piping system.

26. Water closets in private residential applications may be wall mounted or floor mounted, 1.28 gallon per flush, siphon jet type, with manual flushometer. Residential tank style toilets are generally discouraged, but may be approved on a case-by-case basis. Configuration shall include elongated bowl and top spud flushometer connection.

27. Urinals shall be wall mounted, 0.125 gpf, and of the siphon jet or blowout action type, with electronic hands free flush, battery power. Washout urinals and waterless fixtures are not permitted. The use of manual flushometers is discouraged, and may be approved only on a case-by-case basis for non-public, non-food service areas.

28. Lavatory faucets in public applications shall be cast brass construction with polished chrome finish, touch less automatic sensor operation, 0.5 gpm maximum flow rate. The sensor shall allow for automatic shut-off after 10-15 seconds of continuous discharge. The sensor shall stop discharge within one second of detecting user has moved away. Manufacturer's warranted battery life shall be a minimum of three years. The faucet shall include am adjustable ASSE 1070-listed thermostatic mixing device set to a maximum of 110°F.

29. Specify Sloan ETF-600 electronic hand washing faucet with EL-154 transformer and ASSE 1070 thermostatic mixing valve. Substitutions shall be made only with approval of Mason.

30. Lavatory faucets in private residence units shall be cast brass construction with polished chrome finish, single lever manual operation and 2.2 gpm maximum flow rate.
31. Shower control valves shall be of the ASSE 1069 thermostatic or combination thermostatic and pressure balance type, except that shower controls that are of the pressure-balance only type will be permitted for applications where the upstream hot water supply includes an ASSE 1017 master thermostatic mixing valve assembly with continuous thermostatic protection throughout the flow range, and where there are no supplemental energy sources that could otherwise negate master thermostatic protection (e.g. heat maintenance cable).
32. Showers shall be rated for a water flow of 1.5 gpm. Maximum outlet temperature at showers shall be limited to 115°F at the individual fixture limit stop. Shower valves shall be institutional cycling type, rotating through cold to hot with an ADA compliant lever handle. Faucet trim, levers, and escutcheons shall be constructed of stainless steel or chrome plated brass, and all shower valves shall include check stops. Where hand showers are provided trim shall be substantially durable for institutional use and all hangers and slide bars shall be securely anchored to the building structure. The inlet hose serving hand-showers shall include an ASSE 1014 backflow preventer or vacuum breaker, mounted to the wall.
33. Kitchen style sinks for residential and non-residential, non-food service applications shall be commercial grade construction of 304 stainless steel, 18 gauge. Satin finish. Fully undercoated to dampen sound. Sink depth shall be 7.5" to 9" for non-ADA configuration and 6" to 6.5" for ADA configured fixtures. Comply with ANSI/ASME A112.19.3M. Coordinate sink hole quantity, spacing and configuration with specified faucet requirements. Faucets shall be cast brass construction with polished chrome finish, single lever operation with swing nozzle. 2.2 gpm maximum flow rate, include 1.5 gpm aerator, vandal resistant.
34. Kitchen sink disposal: Provide a 3/4 horsepower commercial grade disposal unit at every kitchen sink, unless directed otherwise.
35. Plumbing fixtures and fittings for laboratory furniture shall be provided by the laboratory furniture manufacturer.
36. Service sinks shall be floor mounted rectangular precast terrazzo or cast polymer mop basin with rim guard, minimum 24" x 24" dimensions. Minimum 10 inches (254 mm) high rim. Include tiling flange on sides adjacent to walls. Two handle wall mounted service sink faucet with integral vacuum breaker, hose thread outlet, pail hook and wall bracket. Grid strainer and 3 inch (DN 80) drain as provided by basin manufacturer.
37. Food service recycling spaces: Provide a hot/cold water hose station with hose rack in recycling spaces for general washdown. A cold water hose bib is not adequate. Provide a floor drain in the recycling space connected to the sanitary sewer system.

22 45 00 Emergency Plumbing Fixtures

1. Standard: ANSI Z358.1, "Emergency Eyewash and Shower Equipment."
2. Plumbed, deck mounted eyewash unit.

   Capacity: Deliver potable water at rate not less than 0.4 gpm (1.5 L/min.) for at least 15 minutes.

   Supply Piping: NPS 1/2 (DN 15) with flow regulator and stay-open control valve.

   Control-Valve Actuator: Paddle, stay open design.

   Receptor: Not required, mount to swing over sink basin for operation.

   Drain Piping: Not required.
3. Plumbed, freestanding or wall mounted eyewash unit.

Capacity: Deliver potable water at rate not less than 0.4 gpm (1.5 L/min.) for at least 15 minutes.

Supply Piping, Exposed: NPS 1/2 (DN 15) chrome-plated brass or stainless steel with flow regulator and stay-open control valve.

Control-Valve Actuator: Paddle, stay open design.

Receptor: ABS plastic bowl.

Drain Piping: NPS 1-1/2 (DN 38) minimum, chrome-plated brass, receptor drain, P-trap, waste to wall, and wall flange complying with ASME A112.18.2.

4. Plumbed, single-shower-head horizontal, wall-mounted, vertical, ceiling-mounted, or freestanding emergency shower unit.

   Capacity: Deliver potable water at rate not less than 20 gpm for at least 15 minutes.

   Supply Piping: NPS 1 (DN 25) chrome-plated brass or stainless steel with flow regulator and stay-open control valve.

   Control-Valve Actuator: Pull rod.

   Shower Head: 8-inch (200 mm) minimum diameter, ABS plastic.

5. Plumbed, free-standing or wall mounted eye/face wash unit.

   Capacity: Deliver potable water at rate not less than 3.0 gpm (11.4 L/min.) for at least 15 minutes.

   Supply Piping, Exposed: NPS 1/2 (DN 15) chrome-plated brass or stainless steel with flow regulator and stay-open control valve.

   Control-Valve Actuator: Paddle.

   Receptor: Plastic bowl.

   Drain Piping: NPS 1-1/2 (DN 38) minimum, chrome-plated brass, receptor drain, P-trap, waste to wall, and wall flange complying with ASME A112.18.2.

6. Plumbed, deck-mounted, hand-held drench hose

   Hand held drench hoses are supplemental safety equipment only. They shall not be used as substitutes for fixed, hands-free eyewash or eye/face wash units.

   Capacity: Deliver potable water at rate not less than 3.0 gpm (11.4 L/min.) for at least 15 minutes.

   Supply Fitting: NPS 1/2 (DN 15) brass with flow regulator.

   Hose: Rubber or plastic.

   Control-Valve Actuator: Hand-held squeeze valve.

   Spray Heads: Single or twin.

7. Plumbed, freestanding or wall mounted combination emergency shower and eyewash or eye/face wash unit.

   Piping, Exposed: Chrome-plated brass or stainless steel.

   Unit Supply: NPS 1-1/4 (DN 32) minimum.

   Unit Drain: Outlet at side near bottom.

   Shower Supply: NPS 1 (DN 25) with flow regulator and stay-open control valve.

Eyewash, Eye/Face Wash Supply: NPS 1/2 (DN 15) with flow regulator and stay-open control valve.

Shower Capacity: Deliver potable water at rate not less than 20 gpm (76 L/min.) for at least 15 minutes.

Control-Valve Actuator: Pull rod.

Shower Head: 8-inch (200 mm) minimum diameter, plastic.

Eyewash Equipment: With capacity to deliver potable water at rate not less than 0.4 gpm (1.5 L/min.) or 3.0 gpm (11.4 L/min) for eye/face wash units for at least 15 minutes.

Control-Valve Actuator: Paddle or pull down lever.

Receptor: Plastic bowl.

8. Signage: Provide highly visible signage in close proximity to emergency equipment, as approved by ANSI Z358.1.
9. Emergency shower monitoring kit:
    - For use in areas not normally occupied where an individual may be isolated from other occupants and a remote signal of operation is required to alert others that first aid is necessary.
    - Micro flow switch with time delay relay installed in emergency shower supply to monitor activation of shower. Wall mounted utility controller with normally open dry contact in junction box and mounting hardware.

22 61 13 Compressed Air Piping for Laboratories

1. Compressed air distribution piping shall be OXY/MED copper tubing, ASTM B-819, Type L with BCuP series brazed joints and shall meet the quality requirements established in NFPA 99 for medical oxygen. ACR copper tubing is not allowed due to incompatibilities in pipe and fitting dimensions.

22 62 13 Vacuum Piping for Laboratories

1. Vacuum distribution piping shall be ASTM B 88 copper water tube, Type L with lead free solder joints.

22 63 13 Gas Piping for Laboratories

1. Gas distribution piping shall be OXY/MED copper tubing, ASTM B-819, Type L with BCuP series brazed joints and shall meet the quality requirements established in NFPA 99 for medical oxygen. ACR copper tubing is not allowed due to incompatibilities in pipe and fitting dimensions.

22 66 00 Chemical Waste Systems for Laboratories

1. Laboratory waste drainage and vent pipe and fittings, above grade shall be Schedule 40 fire retardant polypropylene (PPFR), ASTM D 4101. Molded fittings per manufacturer system, ASTM D F1412. Heat fusion socket assembly. DWV pattern. Heat fusion method in accordance with ASTM D 2657 and manufacturer's written instructions.
2. Laboratory waste drainage and vent pipe and fittings, below grade shall be either Schedule 40 fire retardant polypropylene (PPFR) or non-fire retardant, ASTM D 4101. Molded fittings per manufacturer system, ASTM D F1412. Heat fusion socket assembly. DWV pattern. Heat fusion method in accordance with ASTM D 2657 and manufacturer's written instructions.

3. In areas requiring plenum rated materials, laboratory waste and vent pipe and fittings shall be either borosilicate glass, ASTM C 1053 or Schedule 40 PVDF, ASTM F 1673.

22 67 00 Processed Water Systems for Laboratories

1. Distribution pipe material shall be pigmented polypropylene, ASTM D 4101, Type II co-polymer, SDR 11 wall thickness. Socket fusion joints using heat fusion procedures in ASTM D 2657.