Plumbing

Components – Plumbing

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Standards – Plumbing

1. This section establishes the minimum design requirements that must be ~~met~~ incorporated into the project by the Plumbing Design Professional. Minimum code requirements are the current editions of the Arkansas State ~~Plumbing~~ plumbing and ~~Gas~~ gas ~~Codes~~codes. Local codes and standards ~~may~~ shall take precedence over these requirements, provided said codes and standards are ~~considered~~ more stringent.
2. All systems shall be designed in compliance with the current Arkansas Energy Code.
3. ~~Consideration should be given to providing a metering device to measure all water usage for new buildings over 20,000 SF.~~
4. ~~Consideration should be given to providing a metering device to measure all gas usage for new buildings over 20,000 SF~~

~~Site Design Parameter Guidelines~~ Standards – Plumbing Site Utilities

1. Determination of the available site services with regard to gas service, sanitary systems, storm water systems, domestic water systems, and fire service systems is necessary as a part of the site selection process.
2. The building plumbing system ~~design~~ is to be complete to 5 feet outside the perimeter of the building foundation ~~system~~ and shall include all piping, fixtures, appurtenances, and appliances in connection with a supply of potable water (except for fire sprinkler systems), sanitary drainage or storm drainage ~~facilities~~ systems within or adjacent to any building, structure, or conveyance on the premises. The connection to a utility water meter or other public water or sewer utility

Design Guidelines – Plumbing Site Utilities

1. Consideration should be given to providing a metering device to measure all water usage for new buildings over 20,000 SF
2. Consideration should be given to providing a metering device to measure all gas usage for new buildings over 20,000 SF

~~property~~ system or other source of potable water ~~supply~~ or sewage disposal and storm water structures shall be designed by the Site Utility Design Professional from 5 feet outside the perimeter of the building foundation system. Food service grease interceptors, science room acid neutralizing sumps, and gas piping and regulators shall be designed~~, in most cases,~~ by the Plumbing Design Professional.

3. The Plumbing Design Professional is required to evaluate the ~~need~~ anticipated demand and method ~~to provide~~ of supplying gas service to the building. All natural gas piping systems shall be installed in accordance with the Arkansas ~~Gas~~ gas ~~Code~~ code. ~~If natural gas service is not available, the installation of liquid propane gas should be investigated.~~ The estimated gas loads for operation of the ~~heating water~~ water heating boilers, domestic water heaters, food service equipment, science program usage, and miscellaneous items ~~are~~ shall be obtained from the appropriate disciplines by the Plumbing Design Professional and totaled with the inclusion of a growth or safety factor. Discussion with the local gas company is necessary, both to determine potential service costs and to determine the responsibilities of the building owner and the gas company regarding installation. ~~It is also important to d~~Determine the gas pressure requirements for the equipment in the building and communicate this need to the gas company. The Plumbing Design Professional or Site Utility Design Professional shall design the gas service.
4. ~~The plumbing design professional should coordinate with the HVAC design professional and local utility to determine best practice for cooling system(s) condensate discharge.~~

Liquid Propane

- If natural gas service is not available, the installation of liquid propone gas should be investigated.

Condensate Discharge

- The plumbing design professional should coordinate with the HVAC design professional and local utility to determine best practice for cooling system(s) condensate discharge.

Standards – Plumbing Valving

1. Valves will be installed to isolate individual plumbing fixtures and groups of plumbing fixtures to permit shut down of the fixture or equipment ~~item~~ without affecting the remainder of the building.
2. The domestic water system valves shall be bronze construction gate valves or valves with a ball-type conventional port.
3. The gas supply to science rooms and art rooms shall have an emergency solenoid-type, automatic shutoff valve with a manual reset. The purpose of the valve is for shut down of the gas in case of an emergency or when the fire alarm system is activated. A solenoid-type, automatic shutoff valve with a manual reset shall be installed to shut the gas off to the appliances under the kitchen hood in the event there is a fire under the hood. The valves are designed normally closed and are held open by an electric solenoid valve. A mushroom-type wall switch shall be located in the room for solenoid activation.

Standards – Plumbing Hangers

1. Provide hangers for all horizontal, suspended, domestic, water, gas, sanitary, and storm piping with distances as noted in the state and local codes.

~~Guidelines~~ Standards – Plumbing Identification

1. Piping shall be identified in mechanical rooms, unfinished spaces without ceilings, above suspended lay-in acoustical ceilings, and crawl spaces for the type of service and direction of flow. Equipment shall be identified with nameplates.

~~Guidelines~~ Standards – Testing

1. Domestic water, storm and sanitary sewers, and gas piping shall be tested per state and local codes.

Standards – Potable Water Systems

1. All buildings shall include a potable domestic water system serving all sinks, toilets, showers, food service, custodial needs, hose bibs, HVAC plant systems, and drinking water coolers/fountains. All municipal domestic water entering the building must pass through a reduced pressure backflow preventer to protect the outside water source from contamination in the building. Whenever possible, the backflow device shall be located inside the building. A main pressure-reducing valve is required if the incoming water pressure exceeds 75 psi. All backflow prevention devices shall be installed and maintained in accordance with the requirements of the Arkansas Department of Health and/or the municipal water purveyor.
2. Water distribution throughout the facility will be through piping systems located above ceiling areas and below insulation. Piping installed under slab areas shall be avoided where possible, unless accessible for maintenance on the system.
3. Domestic water systems within the building shall be Type K or L copper tubing. The use of polyvinyl chloride, chlorinated polyvinyl chloride, or polybutylene material will not be permitted.
4. Water piping and gas piping to island sinks shall be in an accessible trench in the floor with a removable cover except in kitchens and for trap primers and shall be type K copper pipe.
5. The required pressure for operation of the furthest fixture from the incoming service will determine if a pressure booster system will be required. The booster system should be a packaged unit that includes all controls. Provide a constant-speed duplex pump package with bladder-type compression tank to meet the flow requirements. It will be necessary to consider the installation of an emergency power system in order to maintain the operation of the booster system in the event of power outages, if the building is to be used during emergency-type occupancies. Coordination with the Electrical Design Professional will be necessary.
6. Insulate the piping using fiberglass insulation ~~except in block walls where closed cell insulation may be used~~ to minimum requirements of current Arkansas Energy Code. Vapor barrier shall be maintained throughout piping system including all valves, hangers and terminations. Seal terminations with proper vapor barrier sealant.

Standards – Domestic Hot Water Systems

1. A hot water return system with a re-circulating pump shall be required if the building hot water piping is more than 100 feet in length.
2. The on/off operation of the 120 and 140 degrees Fahrenheit water circulation pumps shall be controlled by time clock operation and an aquastat.
3. Instantaneous water heaters with a storage tank shall be required for high use applications in buildings with kitchens and/or shower room facilities. Tank-type water heaters shall be considered for use in elementary school applications having no dishwasher facilities and no locker rooms.
4. The use of thermostatic mixing valves is required to maintain hot water temperature consistent with the plumbing code requirement of a maximum of 110 degrees Fahrenheit water to hand washing sinks and 120 degrees Fahrenheit water to showers. Use a single valve or a high/low valve system based on minimum and maximum flow rates.
5. Provide a building-wide hot water system; instantaneous water heater for remote locations.

~~Guidelines~~ Standards – Water Conditioning and Softening Systems

1. The water shall be tested for quality to determine the makeup of the water including hardness, mineral content, and chemicals. The ~~recommendation for~~ installation of a water conditioning/softening system ~~should~~ shall be directly related to the results of the water testing. A total hardness of less than 10 grains will not require a softener system.
2. If the grain hardness is above 10 grains per gallon (171 ppm), the water softener shall be sized to reduce the hardness to 10 grains, but never below 6 grains. Soften the hot water only.
3. ~~Review with school personnel before incorporating water softening in the design. A complete water conditioning system, including iron filters, may be necessary in the event the water has high iron content from an on-site well system.~~

Complete Water Conditioning with Iron Filters

- Review with school personnel before incorporating water softening in the design. A complete water conditioning system, including iron filters, may be necessary in the event the water has high iron content from an on-site well system.

~~Guidelines~~ Standards – Sanitary Piping Systems

1. Piping materials shall include Schedule 40 polyvinyl chloride with solvent joints; cast iron no hub; or cast iron, hub and spigot. PVC piping in RA plenum is prohibited.
2. Fill material around piping below slab shall be compacted granular material to 95 percent-modified proctor. Piping shall not be installed parallel/directly under walls.
3. Piping above grade shall be cast iron, no hub with approved hanger spacing or schedule 40 PVC except in any plenum.
4. Acid waste piping below grade will be Schedule 40 polypropylene with fusion joints or lab grade CPVC with solvent cement joints. All acid waste piping above grade shall be Schedule 40 polypropylene with mechanical joints or lab grade CVPC with solvent cement joints. Acid waste

piping in plenum applications shall be fire- and smoke-rated. Acid neutralizing sumps shall be located on the exterior of the building with access to grade.

5. Provide information to the Site Design Professional as to the depth of the sewer(s) exiting the building. Provide information to the Structural Design Professional as to the location and depths of the sewer in relationship to footings and columns as they pertain to the project.
6. Insulate sanitary sewer piping carrying HVAC system condensate.

Standards – Gas Piping Systems

1. Gas piping shall be Schedule 40 black steel with screw fittings for piping 2 inches or less and welded fittings for piping 2 1/2 inches or larger.
2. Gas piping in plenums shall not contain valves or unions.
3. A gas regulator shall be provided to maintain the correct inlet pressure to each gas appliance. The inlet and outlet piping to each regulator shall be valved with Arkansas Gas Code approved valves.
4. The maximum gas pressure into the building shall be as established by the local gas company. Provide the gas company with the gas load for each appliance, and the minimum and maximum operating pressures for each appliance early in the design process.
5. Provide a valve, union, and a dirt leg at each appliance connection.
6. LP gas piping shall not be concealed.
7. Natural gas piping to island sinks shall be in an accessible trench in the floor with a removable cover.

Standards – Roof Drain and Storm Sewer Systems

1. Piping materials shall include Schedule 40 polyvinyl chloride with solvent joints; cast iron, no hub or cast iron, hub and spigot.
2. Fill material around piping below slab shall be compacted granular material to 95 percent-modified proctor. Piping shall not be installed parallel/directly under walls.
3. Piping above grade shall be cast iron, no hub, with approved hanger spacing.
4. Provide connections to all roof drains.
5. Provide information to the Site Design Professional as to the depth of the sewer(s) exiting the building. Provide information to the Structural Design Professional as to the location and depths of the sewer in relationship to footing and column pass as they pertain to the project.
6. Insulate the bottom of roof drains and branch lines from drain to downspout.
7. Insulate storm drain piping carrying HVAC condensate.

Standards – Food Service Areas Systems

1. Ware washing system will have a booster heater to provide 180-degree water unless the system utilizes a chemical dishwasher.
2. Provide 3-compartment sink with 110-degree water.
3. Provide a grease interceptor on the sanitary sewer line serving the food service area. The grease interceptor shall be located on the exterior of the building and will be

sized for a 500-gallon minimum capacity, constructed of concrete or cast iron with access to grade. Interceptor shall meet the Arkansas Plumbing Code and Local requirements. Locate the interceptor as close to the building as practical.

4. Provide 140-degree water to all kitchen equipment except hand washing lavatories and sinks.

Standards – Building Fire Protection Systems

1. All buildings shall have a complete fire suppression (sprinkler) system throughout in accordance with NFPA 13, 14 and 20 when dictated by the design professional. Available static water pressure, residual pressure, and water flow must be evaluated as a part of this determination.
2. Installation of a water storage system along with the fire pump installation may be required where insufficient water, flow, and pressure are present.
3. A backflow preventer shall be included on all incoming systems.

Standards - Plumbing Fixtures and Specialties

1. Water closets shall be china, white, hand operated or battery or hardwired infrared flush valve, wall hung or floor mounted, and low water consumption type.
2. Urinals shall be china, white, hand operated or battery/ hardwired infrared flush valve, wall hung or floor mounted, and low water consumption type.~~Waterless urinals are optional.~~
3. Lavatories shall be wall or counter mounted china and shall have cast brass hand operated or battery or hardwired infrared faucet. Temperature control shall be integral with the faucet or remote mixed (see Domestic Water Heater System Standards).
4. Showers shall be low water consumption, pressure-balanced type.
5. Drinking water coolers/fountains shall be refrigerated and conform to ADA standards.
6. Sinks shall be 18-gauge, 302 or 304 stainless steel
7. Science lab sinks shall be connected with acid-resistant material. The science casework manufacturer shall provide sinks.
8. Large group restrooms shall be provided with lavatories or a comparably sized wash fountain with infrared sensing or manual operation.
9. All plumbing fixtures and trim designed or designated for use by the handicapped shall meet the Americans with Disabilities Act guidelines.
10. Water supply (hot and/or cold) to the lavatories, sinks, and drinking fountains shall have angle stops with loose key handles.
11. All lavatories, water closets, and urinals shall have wall carriers.
12. Floor drains shall be installed in each restroom (except single person toilet room), locker room, mechanical room, and kitchen area. Provide a sediment bucket in the floor drain if conditions exist where solids may enter the drain.

Waterless Urinals

- Waterless urinals are optional.

13. Sanitary and storm sewer cleanouts shall be installed at 100 feet on center inside and outside the building, and at changes in direction of 90 degrees or more, at the bottom of vertical risers, and as the sewer exits the building.
14. Showers shall have a hot and cold, single lever pressure balancing valve with a vandal-resistant head.
15. Service sinks shall be floor-mounted, molded stone, 10 inches high, with a wall-mounted faucet, except as provided in Item 21.
16. Install a cold water hose bib in each large group restroom, locker room, and mechanical room if a hose bibb is not located within 40 feet of these areas. The hose bibb shall be surface mounted behind a lockable door in restrooms and locker rooms, with access by a removable key handle.
17. Reduced pressure backflow preventers are required on the water supplies to each HVAC makeup water system.
18. A water pressure reducing station requiring 2 pressure reducing valves sized for 1/3 and 2/3 flows shall maintain the water pressure in the building to a maximum of 75 psi, if the incoming water pressure can exceed 75 psi.
19. Clay traps shall be provided in art rooms to prohibit clay and solids from entering the sanitary sewer. The clay trap shall be accessible to clean out the trap.
20. Trap primers or trap guards shall be required for all traps inside the building. Trap primers or trap guards shall be accessible for repair.
21. Provide floor drain sinks with hinged covers in custodial closets and the main mechanical room for emptying of the power floor cleaning units, where those devices are used.
22. Install exterior hose bibbs on all exterior faces of the building.