2.05 PLUMBING

GENERAL

It is expected that the plumbing design professional will conform to accepted good engineering design practices. For this reason, most of the items covered in the plumbing guidelines pertain to those items, which may be unique to the University of South Alabama, its mechanical systems or preference or requirements mandated by the University. Any item not specifically outlined or commented upon in these guidelines is left to the judgment of the engineering design professional to use current accepted good engineering practice. The construction documents are subject to review and comment by the Facilities Department at any time during the course of design or construction of the project.

DOMESTIC WATER SYSTEMS

Domestic water heating systems will be designed in accordance with Chapter 49 ASHRAE Handbook, HVAC System and Applications. Provide anti-scalding devices for all domestic hot water.

All water heaters and hot water storage tanks will meet efficiencies set forth in the latest edition of ASHRAE/IES Standard 90.1. Hot water heaters and boilers if required will be inspected by the state of Alabama.

Availability of existing hot water source and cost effectiveness of its use will be investigated while designing a domestic hot water system for the specific project.

Program requirements for hot water will be evaluated to determine whether a code variance to eliminate hot water is desirable.

Desired temperature for hot water is a maximum of 110°F at the point of usage for normal faucet applications. Other types of usage may require other temperatures (dishwashers, cage washers, etc.) and should be evaluated individually. Where temperatures higher than 110°F are required at certain outlets for a particular intended use, separate heaters or booster heaters will be installed for those outlets.

Where rapid fouling due to heavily mineralized water is anticipated, heated water will be outside the tube.

Recirculation pumps in hot water systems will be constructed of non-ferrous material.

EXPANSION TANKS

Allowing the pressure relief valve to dump excess water due to expansion is not acceptable.

All expansion tanks will be installed with provisions for draining and venting.

All hot water systems with backflow preventers will be designed and installed with the most efficient and cost-effective method of thermal expansion.

PIPING

Campus water distribution systems operate at 60-100 psi, which may create the need for pressure reducing stations or other special considerations for specific applications.

Each building will be separately metered. Facilities Management will provide water meter specifications. The Design Professional shall coordinate sizing and location of meters with the Universities Facilities Department. The contractor will be responsible for installation of meter.

HOSE BIBBS AND WALL HYDRANTS

Provide backflow check valves as required by building code.

A hose connection will be installed on roofs where maintenance of equipment requires washing and in each mechanical room.
Hose connections will be located on the exterior of each building. A minimum of one hose connection will be installed on each side of the building. Preferred spacing for hose connections is one every 100’. Where feasible, hose connections should be installed within 15’ of the main entrance to the building. Provide isolation valves on interior feed to deactivate outdoor hose bibs during winter.

All exterior hose connections will be of the recessed socket type.

Provide a 1-1/2” diameter hose spigot connection at every cooling tower location.

Provide one hose spigot connection in each mechanical room in the building.

**DRINKING WATER FOUNTAINS**

Locate units in hall recess if necessary to maintain corridor width. Provide ADA High/Low units at all locations.

All water coolers shall be refrigerated type, with integral coolers. Remote coolers are not acceptable.

Provide appropriate GFI protection.

**WATER PRESSURE**

Campus water pressure typically varies from 80 psig to 130 psig.

**DOMESTIC HOT WATER**

Heat Exchangers with hot water supplied from the central plant are preferred whenever feasible for domestic hot water supply.

Electric Heated Domestic Hot Water: Use only for limited point of use applications.

Natural Gas Heated Domestic Hot Water: Use natural gas to heat water.

For emergency backup, dry tank electrical heated hot water may be required, verify with University project manager.

**SANITARY WASTE AND VENT**

All sanitary waste systems will be designed for a maximum of 140°F material. No material will be dumped in any sanitary waste system having a temperature of more than 140°F. In some cases this will require cooling units on waste discharge.

Every piece of equipment requiring indirect waste (backflow preventers, ice machines, autoclaves, etc.) will be served by a drain at that piece of equipment. More than one piece of equipment can be served by a drain provided pieces of equipment are close to each other and sizing of the drain provides adequate drainage for the equipment. The preferred method for supplying this drain is by use of a floor drain, but other types of drains are acceptable, depending on the individual situation. In no case will drainage be accomplished by installing piping across the floor to a central floor drain.

Cleanouts shall be located in the wall or on the floor, not above the ceilings.

For laboratory buildings, provide separate lab and sanitary waste systems until point of exit from building. For animal holding areas, provide waste system separate from lab waste systems due to clogging of neutralizing system from animal hair and wastes. Verify with University project manager if "divert and capture" of lab waste is required.

Roof Vents: Minimize roof penetrations through the use of manifold sewer system roof vents.

If possible, avoid the use of waste systems lift stations.
NATURAL GAS SYSTEM

Mobile Gas Company provides gas through high and low-pressure distribution systems, depending on location. The Designer should review the preliminary gas system design with the USA ED and C Department early in the design process.

Provide gas shut offs at each floor. Provide cut offs in mechanical rooms. Verify zone valves with University project manager.

LABORATORY VACUUM SYSTEM

Vacuum system including pump and venting must be determined on a project specific basis. Provide vacuum system traps in each lab. Vacuum systems in some labs (such as where carcinogens are used) may need to be HEPA filtered.

COMPRESSED AIR SYSTEMS

At lab buildings only, provide central compressed air system to the greatest extent possible. Provide clean compressed air systems with filters and dryers.

Duty Cycle: Design reciprocating compressors for about 35% duty cycle.

Compressor Type: Rotary or Teflon-ringed reciprocating compressors are acceptable depending on quantity of air needed. When rotary compressors are used, air-cooled oil cooler and after cooler type are preferred, otherwise water conservation measures are required. Use 100% duty cycle rotary screw systems for high demand applications.

Valve Requirements: Provide isolation valves and bypass valves for all filters and dryers.

Laboratory Compressed Air System: Provide clean, oil free compressed air. Typically, provide a duplex unit with filters and dryers.

Quincy or Ingersoll Rand shall manufacture air compressors.

BACKFLOW PREVENTERS

For higher hazard applications, use reduced pressure zone Watts 909. No substitutions will be allowed. Install two half-sized backflow preventers in parallel for main building service. For secondary higher hazard applications in the building, one full size back flow preventer is adequate. For reduced pressure zone Watts 909, provide air gap device piped full size to an appropriately sized floor drain. For certain lower hazard applications, use Watts 007, Watts 709 or Watts 757. Provide a strainer upstream of all backflow preventers with a stop valve upstream of the strainer.

Backflow devices shall be tested by the Contractor prior to acceptance by the University. The Contractor shall provide a record of the test. A Mobile County certified tester must perform the test.

The Contractor shall flush the water line prior to testing.

The Contractor shall flush the water line prior to testing the backflow device to prevent damage to the seals from accumulated sediment.

Use Watts vacuum breakers on all interior and exterior hose connections.

All domestic water systems will have backflow prevention devices at the point of building entry. No metering devices, taps, or other fittings will be located upstream of the backflow preventers. However, if a common supply serves both the domestic water system and the fire protection system, it is preferred the two systems be split outside the building. Install two (2) backflow preventers in parallel, each at 100% capacity, for the potable water systems. Install one (1) double-check assembly on a dedicated fire suppression water system.

All backflow preventers shall be located and configured to allow ready accessibility for maintenance and testing. Minimum clearance is 24” in all directions.
No backflow preventers shall be located more than 4' above floor level without a platform constructed for access.

Pit installations of backflow preventers will not be allowed.

Drainage from backflow preventers must be air-gapped and possible by gravity only, either to a floor drain or to surface of the ground.

The City of Mobile requires that all backflow preventers be insulated.

**WATER SOFTENERS**

Water softeners will supply soft water to domestic hot water systems.

Water softening is required on all central hot water systems. Other water will not be softened except for specific applications requiring softened water.

All water softening equipment will be installed with a test port immediately downstream from the softening equipment.

Water softening systems should be designed to supply water at less than 1 grain of hardness. Water supply typically has 7-10 grains of hardness on Main Campus and 25 grains of hardness on the University of South Alabama Research Park Campus.

The Design Professional shall coordinate sizing and specifications of water softeners with the USA ED and C PM.

**HOT WATER HEATING**

An auxiliary pressure relief valve must be installed (per current Plumbing Code) on hot water heating systems. This valve is in addition to the standard temperature and pressure safety valve on the domestic hot water heater. The relief valve shall be designed for repeated operation.

An electrical disconnect may be required due to the size of the boiler.

**PUMPS**

Grundfos or Bell & Gossett shall manufacture all plumbing circulation pumps. (Under 3 hp)

**PIPEING**

Soil, waste, vent and rainwater – below floor – PVC

Soil, waste, vent and rainwater - above floor - PVC

Domestic water piping - Shall be copper under 2”. Use PVC larger than 2”. Piping shall be Type “L” above ground and Type “K” below ground. The use of “Press-fit” couplings shall not be allowed.

Valves - Shall be as manufactured by Crane, Hammond, Milwaukee, Nibco, Powell or Stockham. All valves shall have steel or malleable iron hand wheels. Pot metal handwheels are not acceptable.

**PLUMBING FIXTURES**

All plumbing fixtures shall be as manufactured by American Standard, Crane, Eljer, Kohler, Zurn or Toto. Flush valve type fixtures are preferred over tank type fixtures. If used, flush valves shall be battery powered automatic type.

Toilets shall have a “dual flush” flush valve.

Urinals shall be low flow 0.5 gallons per flush.
FAUCETS

Provide kitchen faucets manufactured by Delta. Provide lavatory faucets manufactured by Zurn, Toto, Sloan, Kohler or Chicago. Provide laboratory faucets and accessories manufactured by Chicago. Automatic faucets should be used for all restroom lavatory faucets. An exception would be faucets in residential facilities. These faucets should be manual. Laboratory faucets to be wrist blade handled to meet CDC regulations.

WATER HEATERS

Electric - Shall be as manufactured by Rheem, Ruud, A.O. Smith or State. Steam - Steam instantaneous water heaters as manufactured by Aerco are preferred where applicable. Electrical disconnects will be provided per code.

BRANCH LINES

All branch lines that supply a specific area of the building (such as a toilet room complex or a group of labs) shall be valved near the mains so that these areas may be isolated from the systems for repairs without having to shut down the whole building.

FLOOR DRAINS

In general floor drains shall be provided for mechanical rooms, laboratories, rest rooms, under emergency showers and in general locations to accommodate release of water from fire protection systems. Typically, the use of floor drains in rest rooms is not required for the smaller single fixture size rooms. The Designers shall discuss floor drain locations with the USA ED and C Department during the design phase. All mechanical rooms will have a minimum of one floor drain. More floor drains will be installed as required to maintain a minimum ration of one floor drain for every 500 square feet of floor area. These floor drains are in addition to those drains required for equipment. Floor drains will be designed to drain the floor around them by the force of gravity. Specify in specifications that each floor drain will be tested to ensure that water on the floor in the area served by the drain is able to reach the drain by the force of gravity alone. The pitch of the floor shall be toward the drain. Floor drains shall be provided in all toilet rooms. Square drains for tile floors, round drains for concrete floors. Floor drains shall have adequate capacity to serve the drainage needs of the area in which they are situated and shall serve the standard drainage needs of the equipment in the area. Floor drains to be installed with trap primers per code.

ELEVATOR SUMP PUMP

Provide positive drainage from the elevator sump pit. If this is not possible, install an GFI protected electrical sump pump piped to a building drain.

TRAP PRIMERS

Trap primers shall be manufactured by PPI.

LABORATORY WASTE PIPING

Consider the use of Spears Manufacturing piping, Zurn Chemical Drainage Systems piping and IPEX piping for laboratory waste. We are currently in the process of developing specific requirements for laboratory waste piping. Discuss with USA Facilities for the particular application prior to developing specifications. The use of any type of plastic piping for acid waste is a point of contention at this time. We must be careful that all products meet the requirements of the local and State of Alabama fire regulations.
FAN COIL UNIT DRAINAGE

Drainage piping shall be a minimum of 1”. Care should be taken to have adequate pitch and adequate depth of p-traps. Designer shall clearly detail drainage piping from fan coil units to sanitary waste plumbing.

STORM SEWER SYSTEMS

All surface water will be directed to a storm sewer system. In no case will storm water be placed in a sanitary sewer system and no mechanical room floor drains shall be connected to the storm sewer system.

SPECIAL SYSTEMS

Emergency showers and eyewashes shall be provided as required. Provide tepid water only.

All piping to emergency showers and eyewashes will comply with ANSI Z358.1 2004.

In new construction, any situation requiring either an emergency shower or eyewash should have both installed. It is preferred that they be co-located. Drainage for showers and eye washers will be to a floor drain.

All emergency showers will have a local alarm to notify persons in the area that the shower is in use.

Designs for installations of emergency showers or eyewashes should consider the feasibility of providing an alarm connection to the building security system.

Provide floor drains at all locations.

FIXTURES

All water flow control devices will be of the water conserving type. Waterless urinals are not permitted.

In new construction, all fixtures will be wall-hung. In existing construction, wall-hung fixtures are preferred if feasible.

Locations of electric water coolers and fixtures with automatic flush valves (battery), with courtesy flush button, will be noted on electrical and plumbing plans. All pre-wired plumbing fixtures will be noted on the architectural drawings.