

Mechanical Design Guide

23 00 10 General

- A. Refer to Campus standards for controls.
- B. Construction documents shall reference local codes and standards with all local amendments.
- C. Contractor shall be required to obtain all relevant permits.
- D. ASHRAE Standard 90.1 or International Energy Code shall be used to verify all energy requirements. Verify with local authority for which version is required.
- E. The International Mechanical Code shall be used for all HVAC design including ventilation standards. For Hospital and Healthcare work use Guidelines for Design and Construction of Hospitals by Facility Guidelines Institute (FGI).

- F. Default outdoor design conditions to be used (coordinate with facility):

Winter	18°F DB
Summer – Cooling	92°F DB / 75°F WB
Degree Days Heating	2918 (HDD65)
Degree Days Cooling	5206 (CDD50)
Climate Zone	3A

- G. Default Indoor design conditions (coordinate with facility for specific spaces).

Winter	70°F DB
Summer – Cooling	72°F DB / 45-55% RH
Summer - Evaporation	88°F DB / 78°F WB
Max Space Humidity	60% RH

- H. ASHRAE Applications Handbook shall be used for Sound and Vibration Control.
- I. Access panels shall be provided for all devices (Fire dampers, actuators, volume dampers, etc.)
- J. Any serviceable devices located above a hard ceiling shall be provided with access panels large enough to replace the equipment.
- K. Manufacturer’s requirements for equipment clearance shall be maintained and indicated on drawings.
- L. Manufacturer (or factory trained representative) shall startup and test all equipment to verify manufacturer’s recommendations have been followed. Adjust equipment as

needed. A start up report shall be included in the closeout documents.

- M. All systems shall be cleaned, flushed, and pre-treated (where required) prior to startup.
- N. All HVAC systems shall be cycled prior to substantial completion.
- O. Contractor shall provide training for owner on major equipment installed.

23 00 62 Equipment Supports

- A. Housekeeping pads (minimum 4" thick, reinforced concrete) shall be provided on all major HVAC Equipment (AHU's, Pumps, etc.).

23 00 95 Test & Balance

- A. Test and balance shall be performed by a third-party contractor who is an Associated Air Balance Council (AABC) certified contractor. The test and balance contractor shall not be the mechanical contractor.
- B. Test and balance report shall include explanations and recommendation for remediation for readings that could not be balanced.

23 07 13 Ductwork Insulation

- A. Internal duct liner is only allowed for noise reduction and shall not be used as a method for thermally insulating single wall ductwork.
- B. All ductwork shall be externally wrapped with fiberglass or elastomeric insulation or shall be factory fabricated double wall duct.
- C. Glue-on/stick-on pins shall not be used for insulation installation. Support pins shall be welded to the duct.

23 07 19 Piping Insulation

- A. Sealed end joints of pipe insulation with appropriate jacket material.
- B. Elbows and fittings shall be fully insulated.
- C. Underground pre-insulated pipe shall be insulated with polyurethane or cellular glass with an HDPE jacket.
- D. Chilled water piping shall be insulated with cellular glass, polyisocyanurate, or elastomeric.
- E. Hot water piping shall be insulated with fiberglass.
- F. Steam and condensate piping shall be insulated with fiberglass.
- G. All piping shall have HDPE or PVC jacket. PVC jackets applied outdoors shall have UV barrier.

23 08 15 Ductwork

- A. Sheet metal duct as per SMACNA standards is the only type of ductwork allowed unless a different material is required based on the duct service (Kitchen hoods, lab gas, etc). Fibrous Glass Duct (ductboard) shall not be used.
- B. Flexible Duct is allowed at a maximum length of 3 feet at air distribution devices.
- C. Ductwork other than galvanized steel (stainless steel, aluminum, etc.) shall be indicated on the plans.
- D. Underground ductwork is not acceptable.
- E. Fully welded and watertight ductwork shall be used for kitchen exhaust ducts and fume hood exhaust.

23 09 01 HVAC Instrumentation and Controls

- A. All control systems shall be compatible with owner’s front-end system and must be Backnet native.
- B. Contractor shall test and adjust controls system prior to any commissioning.

23 10 00 Piping

- A. Below Grade

Type	< 3"	≥ 3"
Chilled Water	Copper, Type L or HDPE	Ductile Iron or HDPE
Hot Water	Copper, Type L or HDPE*	Black Steel, Sch 40 or HDPE*

* Verify HDPE is compatible with hot water temperatures.

- B. Above Grade

Type	< 3"	≥ 3"*
Chilled Water	Copper, Type L	Black Steel, Sch 40
Hot Water	Copper, Type L	Black Steel, Sch 40
Condenser Water	Copper, Type L	Black Steel, Sch 40

* 3" and larger piping shall have butt welded fittings.

Refrigerant	Copper Tubing, Type "ACR"
Steam	Black Steel, Sch 40, ASTM A53
Steam Condensate	Black Steel, Sch 80, ASTM A53
Make-up Water	Copper, Type L, ASTM B62
Chemical Treatment	Verify with University Project Lead

- C. Pipe mains shall be located above corridors when possible.
- D. Precast thrust blocks are not acceptable. Formed and poured in place thrust blocks are required.

23 10 00 Valves

- A. Isolation valves shall be provided to allow for isolation of each piece of equipment.
- B. All branch takeoffs shall have a isolation valve.
- C. At a minimum each floor shall have an isolation valve to allow the floor to be shut down independently from the rest of the building.
- D. Any laboratory space shall have isolation/shutoff valves on all services to allow shut down of the lab space separate from the rest of the building.
- E. Isolation valves shall be located to allow maintenance or equipment removal.

23 21 23 Pumps

- A. All pumps for heating and cooling shall be base mounted, vertical centrifugal. Larger capacity pumps may be horizontal split case. Pumps below 25 gpm may be inline.
- B. Pumps for steam condensate shall be duplex receiver type.

23 52 00 Boilers

- A. The Alabama Boiler and Pressure Vessel Safety Act shall be followed for all boilers and pressure vessels.
- B. All boilers shall have emergency shutdown button. Switch shall be located a mechanical room exit.

23 70 00 Air Distribution

- A. Air distribution devices shall be stainless steel or aluminum and corrosion resistant.
- B. Visible interior of return air grilles shall be painted flat black.
- C. Finishes of all devices shall be coordinated with the architect/owner.

23 73 23 Air Handling Units (AHU)

- A. All spaces shall be served by a Variable Air Volume (VAV) AHU with hot water

reheat, unless approved otherwise by owner.

- B. AHU's shall be double wall construction.
- C. Drain pans shall be stainless steel.
- D. Provide Auxiliary drain pans with water sensor on all units above ceilings and in mechanical rooms. Sensor shall shut unit down and alert BAS.
- E. All AHU coils shall be provided with pressure gauges and thermometers on supply and return of each coil.
- F. Provide P-T Plugs adjacent to all control sensors.
- G. AHU filters shall have a Minimum Efficiency Reporting Value (MERV) of 10. Coordinate with owner for areas that require a greater MERV. All filters shall be replaced at Substantial Completion. Coordinate with owner if additional set of filters should be provided.