DIVISION 15000 - MECHANICAL UTILITIES AND

EQUIPMENT Part 1 – GENERAL

Introduction

The Florida State University Mechanical Design Guidelines were created to assist the design professional in the development of projects that meet the specific needs of the University. In general, the guidelines are not fully descriptive of all mechanical design. In fact, the intent is that engineers from the Utilities & Engineering Services team will be involved in the project from program development through commissioning. The team will work closely with the A/E team assigned to the project to assist in the development of a conceptual design that satisfies both the details specified in the Design Guidelines as well as a review of other design elements. The conceptual design will be reviewed for compatibility with other University priorities such as reliability, maintainability, and energy conservation.

The design review process, as provided by the Utilities & Engineering Services team will primarily review project documents for compliance with agreed upon design concepts. It is expected that the A/E team will be fully responsible for ensuring that the designs meet applicable codes. In the spirit of cooperation, the Utilities & Engineering Services team will willingly share any advice or recommendations that may simplify or enhance the final design.

Process Simplification

Mechanical Design has become unnecessarily complex over the past several years. Some of the reasons noted by design professionals are that compliance with LEED, the Florida Energy Code, and/or other initiatives necessitate the complexity. The reality of modern building design is that many of the challenges to MEP designers are more effectively resolved in the architectural design phase. The expectation is that the architectural design should facilitate a simple MEP design. The MEP design should have the minimum amount of complexity to meet the building performance requirements.

Energy Conservation

The Mechanical Design Guidelines direct the A/E team to determine an estimated EUI (kBtu/sqft) early in the conceptual design process. The projected building consumption should be in line with other buildings of the same type and occupancy. The specific energy design goal will be mutually agreed upon by the A/E and Utilities & Engineering Services teams.

1.1 Overview

A. Coordination of utility connections: All utility work shall be coordinated with and approved by Utilities & Engineering Services through the Project Manager.

B. Utility Connection Approval: Utility work and connections to University utility systems must be properly planned to prevent disruption of classes, research efforts or life in the Residence Halls... All utility work shall be coordinated with the Utilities Section through the University Project Management Section. Each drawing that shows a connection to existing utilities must have a note that states that the Contractor shall request permission for all outages as far as possible in advance. This shall be a minimum of 14 days except in case of emergency. It shall be noted that even with the advance notice, it will not always be possible to grant the requested time and date, as classes and research must have precedence. Permission must be obtained, through the project manager, from the Utilities Section. Explicit details must be shown for all connections to existing utilities. Utilities & Engineering Services must approve both the location and method of the proposed connection, in advance... Note: this applies both to temporary construction utility connections as well as the permanent utility connections.

1. It shall be the responsibility of the A/E to investigate and determine the actual location of all underground utilities or obstructions at the building site before beginning design work. The University will provide all available information as appropriate.
2. The construction contract specifications shall provide for the orientation and training of University personnel on all installed equipment and systems.
3. The contractor shall pay for utilities during construction, including, but not limited to electricity, chilled water, steam, and water. The contractor shall contract with the City of Tallahassee whenever possible. If it is necessary to have construction utilities supplied from the University, the contractor shall install temporary services in accordance with local codes. The University will bill the contractor monthly for utilities used. Shall the University wish to make an exception to this; the A/E will be so informed.
4. Heat, air conditioning, humidity control and any other environmental factors shall be the responsibility of the contractor throughout the construction period.

C. Life Cycle Cost Analysis: The Architect/Engineer shall conduct a life-cycle cost analysis of alternative architectural and engineering designs **prior to the creation of construction drawings** to evaluate the efficiency of energy utilization for competing designs in the construction of new buildings. These requirements also apply to major building renovations including the replacement of major energy consuming equipment in existing buildings. The University Project Manager will advise the A/E as to the time during the Design that this life cycle analysis is due.

1. Such life-cycle costs shall be the sum of:

    a. The reasonably expected fuel costs over the life of the building, that are required to maintain illumination, power, temperature, humidity, and ventilation and all other energy-consuming equipment in a facility, and

    b. The reasonable costs of probable maintenance, including labor and materials, and operation of the building.

2. To determine the life-cycle costs the analysis shall include, but not be limited to:

(a) The orientation and integration of the facility with respect to its physical site.

(b) The amount and type of glass employed in the facility and the directions of exposure.

(c) The effect of insulation incorporated into the facility design and the effect on solar utilization of the properties of external surfaces.

(d) The variable occupancy and operating conditions of the facility.

(e) An energy consumption analysis of the major equipment of the facility's heating, ventilating, and cooling system, lighting system, hot water system, and all other major energy-consuming equipment and systems as appropriate. This analysis shall include:

(f). The comparison of alternative systems.

(g). A projection of the annual energy consumption of major energy-consuming equipment and systems for a range of operation of the facility over a 25 year life of the facility. The analysis shall include the replacement costs of major equipment that has a life expectancy of less than 25 years. Projections must accurately reflect anticipated kBtu/sqft. Building EUI must be demonstrated to be within the range of other best performing within its class.

(h). The evaluation of the energy consumption of component equipment in each system, considering the operation of such components at other than full or rated outputs.

3. The Architect/Engineer shall prepare data, make the input and run the analysis on an appropriate Life-Cycle Cost Computer Program such as the Trane Trace Ultra 600, Carrier HAP 3.0, Elite Software's Energy Program or other program based on DOE standards and approved by the University.

4. Before preparing the data, the Architect/Engineer shall discuss the energy-saving schemes proposed for the Project with the university Project Manager and the Director of Utilities & Engineering Services. The Architect/Engineer shall submit two sets of the following to the Owner: cover letter discussing the energy saving schemes considered, the computer results, the Architect/Engineer's recommendations and discussion of other energy-saving measures incorporated into the Project design, copy of the university Project Manager's written concurrence with the schemes and the complete computer run printout. The university Project Manager will notify the Architect/Engineer of the approved scheme to incorporate into the project.

D. Owner Project Requirements - LEED: The intent of the Owner's Project Requirements Document is to detail the functional requirements of a project and the expectations of the building's use and operation as it relates to commissioned systems.

The Owner's Project Requirements Document should be completed before the start of design and furnished to the design team and Utilities & Engineering Services. It must be completed prior to the approval of Contractor submittals of any commissioned equipment or systems to meet LEED requirements.

E. Metering: All utilities are to be metered for each building, including electricity, water, steam, natural gas and chilled water. All utility metering must be coordinated with the University Project Manager prior to construction. All metering devices must have the capability to report to the Campus Energy Management System via the BAS secondary field level network used in the building. If the building contains Auxiliary occupants in addition to E&G occupants, separate metering must be provided for each Auxiliary occupant. This shall be coordinated with Utilities & Engineering Services and Utilities Accounting through the Project Management Section. All meter selections and their installation location for any meter used for Utility billing purposes must be approved by the Director of Utilities & Engineering Services.

F. Separation for noise control: separate mechanical equipment and other noisy areas from academic and office areas.

G. Outdoor air inlet location: Care shall be taken in the placement of all outdoor air inlets to ensure that odors and other pollutants (automobile exhaust, generator exhaust, fume hood exhaust, etc.) do not enter the building.

H. Mechanical Room Access: Mechanical rooms must have adequate openings to facilitate the removal and replacement of major pieces of equipment. Provide double 3'-0" doors which swing outward, with active/inactive leafs.

I. Equipment Access: There must be adequate space in mechanical rooms to provide ample access space around all equipment for routine maintenance items and procedures, such as filter replacement, lubrication, and so on. Equipment room size must be approved by the Director of Facilities Maintenance and the Director of Utilities & Engineering Services once final equipment selections are complete.

J. Access to mechanical rooms: shall not be through other rooms. It is preferred that access to these spaces be achieved from a main corridor and/or exterior space. Access shall not be by ladders. Where possible, penthouse rooms shall have elevator access.

K. Storage in Mechanical Rooms: Mechanical rooms and similar spaces are not to contain storage areas. All power disconnects to equipment shall be so located as to be easily accessed.

L. All HVAC controls: shall be of the direct digital type and conform to the standard outlined in Building Automation and Central Monitoring Systems.

M. Air eliminators: All hydronic systems shall have adequate air eliminators installed.

N. Central-Station air filtration: Provide MERV 9 air filtration or approved alternate rating on all central-station air handling units.

O. Steam Manhole design: shall be carefully coordinated with the University Project Manager and the Utilities Section. Contact Director of Utilities & Engineering Services for latest manhole standards.

P. Underground piping installation: All piping utilized for underground piping is required to have the ends sealed prior to storage or use on site. No end seals shall be removed until the end in question is actually ready for welding or otherwise connecting. In no event shall any piping be left in a trench with an open end at any time. This requirement shall be strictly enforced. All pre-insulated pipe must be installed per manufacturer's instructions.

Q. Systems Test & Balance: will be provided through the A/E as an additional service. The specifications will require the contractor to participate in the testing, make any changes necessary and pay for any re-testing that may be required to make the systems meet specifications. A copy of the Testing & Balance report shall be made available upon completion to the Utilities & Engineering Services team.

R. Air Handling Unit Condensate Drains: All air handling unit condensate drain pans must drain to the storm sewer system, with a by-pass to the floor drains when using chemicals to clean coils.

S. Return air plenums: Mechanical rooms shall not be utilized as return air plenums.

T. Ventilating and cooling of Mechanical rooms: Mechanical rooms that generate heat such as steam rooms and pump rooms shall be cooled using a thermostatically controlled forced air ventilation system utilizing outdoor air. Generally, pump rooms and similar spaces with electronic systems such as variable speed drives, shall be separated from rooms containing steam reducing stations and condensate pumps. Wherever possible, intake air shall be directed into the pump room and removed from the steam room. If cooling using outdoor air is considered not feasible, an alternative cooling scheme shall be submitted to the Director of Utilities & Engineering Services for approval.

U. Labeling of mechanical equipment: such as air handlers, pumps, exhaust fans, etc., shall be referred to and labeled by floor number, i.e., EF3-5 would be the fifth exhaust fan on the third floor. Equipment schedules shall indicate use, area served and power source.

V. Demarcation between new insulation and existing asbestos insulation: The A/E shall contact the University Department of Environmental Health and Safety Asbestos Coordinator prior to the commencement of a renovation project in order to determine the specifications for labeling and demarcation of the extent of new (non-asbestos) pipe insulation applied by the mechanical contractor following any abatement of asbestos pipe insulation for the project.

W. Piping & Valve signage: Pipe signage shall include color coded labeling for material conveyed as well as direction of flow. All physical valve tags must correspond to the mechanical drawings.

Z. Utilitzation of the district utilities:

Steam - Whenever possible, utilize the campus steam system as a heating source with pumped condensate return to the Central Utilities Plant.

Chilled Water - Utilize the campus chilled water system for cooling if at all possible. When the air conditioning system cannot be connected to the Central Chilled Water System, contact the Director of Utilities & Engineering Services to discuss potential alternatives.

Part 2 - PLUMBING

2.1 Overview

A. Floor drains: are to be provided in all toilet rooms, custodial closets and mechanical rooms. Where necessary, are to be placed at the lowest point in the area.

B. Strainers: All piping system strainers shall be equipped with valves for blowdown cleaning.

C. Hose bibs: shall be provided in toilet rooms located underneath the sink, mechanical rooms and at 100-foot intervals in exterior areas for maintenance use.

D. Joint sealer: Teflon containing joint sealer shall be utilized in all screwed piping installations.

F. Valve Boxes: All exterior valves shall be fitted with a complete one-piece valve box unit constructed of concrete, steel or plastic. The box shall have a protective cover and be set in concrete. The installation shall be such to support small vehicle and lawn maintenance equipment.

G. Urinals: Urinal model and type will be specified by Florida State University Design & Construction and approved by the Director of Facilities Maintenance. Urinals shall be

provided with automatic flushing sensors. Urinals shall be designed to meet the gallon per flush requirements of the Florida Building Code.

H. **Lavatory Faucets:** shall be provided with automatic sensors. Where sensors are not considered cost effective, timed shut off valves shall be used. Flow rates shall comply with the Florida Building Code.

Washbasins: Standard type washbasin shall have strainer type drain, lever handles equipped for handicapped use, cold water faucets, no hot water faucets (except in dormitories and service buildings) and soap dispensers. Use of hot water in any other locations is prohibited except when approved by the Director of Utilities & Engineering Services.

J. Water Closets: shall be wall mounted and designed to meet the gallons per flush criteria of the Florida Building Code.

K. Custodial closet faucets: shall be single delivery mixing type with hot and cold water and have threaded spout equipped with a vacuum breaker and a three-foot hose. Place faucets 30" - 36" above sink rim.

L. Bottle Refilling Stations: In new facilities, provide at least one drinking fountain which includes a bottle refilling station. This unit should be located on the ground floor and be readily accessible from the main entry. Installation should be ADA compliant.

M. Domestic Water Piping: Below grade, all domestic cold water piping exterior to building shall be ductile iron or PVC. Underneath buildings, piping shall be type K copper or ductile iron. All domestic water piping inside the building and above grade shall be type L copper, except for high purity water. Materials for high purity water systems shall be coordinated with the University Project Manager.

N. Domestic water pipe insulation: all domestic hot water piping shall be insulated with Armaflex pipe insulation and the domestic cold water piping that is exposed in unconditioned spaces shall be insulated with Armaflex to prevent sweating. All elbows should be void free. In general a pre-formed or 3 three sectioned mitered elbow should be sufficient. All insulation must be installed as to be a continuous system.

O. Water Meters and Taps: The City will furnish water meters and taps for domestic and fire water.

P. Tap fees and system charges: shall be paid for by the Contractor. The City of Tallahassee has jurisdiction over the installation. Install water meters and water backflow preventers above grade and provide insulated cover. Install backflow preventers in accordance with City Ordinance. Contact the City for their requirements and information. The City's approval for all proposed connections must be received prior to completion of the 100% documents. Written proof of the City's approval must be provided to Utilities & Engineering Services prior to bidding the project.

2.2 - WATER BASED FIRE EXTINGUISHING SYSTEMS (Where required)

A. Water Based Extinguishing System: The contractor shall furnish all labor and equipment for the complete installation of a water based fire-extinguishing system and shall be the installing contractor or site representative with the required license. No subcontracting will be allowed. The contractor must be NICET level III certified and must possess the appropriate class I or class II fire sprinkler license as required by the State of Florida.

B. Codes: Fire water based systems shall be installed, inspected, tested and certified per appropriate NFPA 13, 14, 20, 24, 25, including NFPA 101. Any applicable codes shall apply to meet State of Florida and Fire Marshal requirements, local and state jurisdiction.

C. Warranty: The fire system contractor shall be responsible for equipment, materials and workmanship of the system for one year. The warranty shall be enforced 24 hours a day, contractor will also respond after being advised of his responsibility and the nature and/or

condition of the equipment that has failed by the FSU Fire Systems on-call technician. After notification has been made to the responsible equipment contractor, a maximum of one hour will be allowed to respond and arrive on site. When the problem has been secured or corrected to the satisfaction of the technician o the FSU Police Department will be notified.

D. Backflow preventers: The installation of fire water mains shall included backflow preventers in accordance with TREEO (Training Research & Education for Environmental Occupations) set forth by the University of Florida and NFPA requirements including City Ordinance. Contact them for their requirements and information. All fire mains and/or valves shall be painted and labeled to indicate the proper building name controls. The City must approve all connections to the City water mains. The City's approval must be received prior to completion of the 100% documents. Written proof of the City's approval must be provided to the Utilities Section prior to bidding the project.

E. Connections and fittings: Fire water system connections and fittings shall be compatible with the City of Tallahassee Fire Department fittings. Contact them for information.

F. Spare escutcheon plates: Provide six extra Escutcheon Plates of each type installed on any system, installer will provide manufacturer name and address, supplier name and address and parts number.

G. Drains and inspectors test drains: The main drains and inspectors test drains be piped to an adequate drain or outside the building. When piped outside the drain shall not affect the architectural design and landscaping of the building. When piped outside the building, the water flow shall not pose a threat to persons on sidewalks or streets adjacent to the building.

H. Gauges: Provide 3-1/2" gauges with a connection not smaller than 1/4", and each gauge connection equipped with a shutoff valve and provisions for draining.

I. Valves: All control, drain and test connection valves shall be provided with permanently marked weatherproof metal or rigid plastic identification signs. The sign shall be secured with corrosion-resistant wire, chain or other approved means.

J. Valve signage: All control valves will have proper signage to indicate the areas of coverage. This will start from the feed supply into the building through all branch lines.

K. On systems with fire pumps: the use of PVC and/or plastic pipe, fittings, or components will not be acceptable.

2.3- HEATING AND STEAM

A. Steam Pressure: Steam is supplied at pressures varying between 70 psig and 125 psig, depending on the season. The building steam systems shall have a maximum utilization pressure of 50 psig and shall be designed to operate with the inlet pressure to the building varying between 70 psig and 125 psig.

B. Pipe Materials: All high pressure and low pressure steam piping shall be Grade A ASTM A53B, schedule 40 seamless piping, and condensate return lines shall be schedule 80 seamless pipe. The use of pre-insulated steam and condensate return piping is permissible. Contact the Director of Utilities & Engineering Services for currently approved types and manufacturers.

C. Expansion Loops: All steam and steam condensate lines underground shall have properly sized expansion loops, which shall be properly anchored. If pre-insulated piping is used, the expansions loops shall be sized and located per manufacturer's instructions.

D. Valves: Valves installed above grade as part of the high-pressure steam system, and valves installed below grade, shall be 300 lb. valves. Valves that are 2-1/2" and larger shall be flanged, and all valves less than 2-1/2" shall be screwed. For valve requirements in steam manholes, contact Director of Utilities & Engineering Services for latest manhole standards. See Controls Design Guidelines for control valve standards.

E. Pipe connections: All piping that is 2-1/2" and larger shall be welded, not

screwed. A certified welder shall weld all underground fittings.

F. Steam pipe fittings: High pressure steam fittings 2" and larger shall be butt-welded and flanges shall be weld neck flanges. 1-1/2" and smaller shall be forged steel screwed or socket weld. Unions that are 2" or smaller shall be 300 lb. screwed cast iron or forged steel. High pressure steam nipples shall be schedule 80. Low pressure steam fittings that are 2" and larger shall be schedule 40 butt welded fittings, and flanges shall be weld neck type. Low pressure steam fittings that are 1-1/2" and smaller shall be 150-lb. cast iron using 300 lb. cast iron unions and schedule 40 nipples.

G. Condensate pipe fittings: Condensate lines that are 2-1/2" and larger shall be schedule 80 butt weld fittings and steel weld neck flanges that are the same pressure class as the valves. Condensate lines that are less than 2-1/2" shall be forged steel or socket weld using 300 lb. screwed unions and schedule 80 nipples.

H. Condensate receiver vents: All steam condensate receiver unit vents shall be run full size from unit to a safe discharge location. In no case is the discharge to be over a sidewalk or other public area. In addition, discharges shall not be located near air intakes.

I. Insulation:

Above Grade:for high and low pressure steam and condensate lines above grade shall consist of 2" Foamglas.

Below Grade: Condensate and steam lines shall be a 2" Foamglas outer layer wrapped with Pitwrap SS jacketing. Where Foamglas components are formed, Pittsburgh Corning Hydrocal B-11 shall be used as the bonding compound. All seams and joints shall be sealed with silicone caulking. Condensate lines below grade shall have Foamglas insulation wrapped with Pitwrap SS jacketing. The attachments for the insulation below grade shall be stainless steel wiring or bands, or 16 gauge copper wire, on 9" centers. Deviations from the above shall be approved by the Director of Utilities & Engineering Services. If pre-insulated pipe is considered, approval must be granted from the Director of Utilities & Engineering Services. See latest manhole standards for manhole insulation requirements.

J. Manufacturer's instructions: All insulation materials shall be installed according to the manufacturer's instructions.

K. Gauges: All pressure and temperature gauges shall be 4-1/2" face, bottom connection, and industrial grade. All temperature gauges shall be mounted in wells.

L. Steam pressure reducing valves: All steam pressure reducing valves shall be approved by the Director of Utilities & Engineering Services. Contact Director of Utilities & Engineering Services for currently approved steam pressure reducing valves.

M. Condensate pumping units: All condensate pumping units shall be above grade and shall be duplex electric pumps with cast iron receivers and ceramic seals. The pumps shall be equipped with balanced mechanical seals. Steam pressure powered pumps are not acceptable.

N. Water pumps: shall be equipped with balanced mechanical seals.

O. Drip traps: Install drip traps before all thermostatic temperature-regulating valves and pressure reducing valves. All drip traps should be TLV JS3X series. Use #10 orifice for pressures over 30 psi and #2 orifice for pressures 30 psi or lower. If a larger trap is required, contact Utilities & Engineering Services for recommendations.

P. Bolts and nuts: shall be hex configuration, coarse threaded, and be of ASTM A-193, Grade B7 alloy steel such as USS Supertanium alloy, or equivalent.

2.4 - CENTRAL UTILITY PLANT (CUP) CENTRAL CHILLED WATER SYSTEM/BUILDING INTERFACES

A. General: The following are requirements for new building designs in order to best produce the most efficient utilization of the Central Utility Plant (CUP) system, utility distribution system, and the building.

1. The Central Utility Plants are designed as a variable flow system to achieve maximum energy economics. The design of the building shall be such as to operate over a varying pressure range.
2. The connection between the building and the Central Chilled Water Distribution System shall be approved by the Director of Utilities & Engineering Services. The building pump(s) and the distribution pump(s) shall be completely decoupled.
3. The CUP is operated to produce 45 to 48 degrees F. chilled water depending on overall system needs and energy conservation measures being utilized.
4. Existing pressures leaving the CUP vary from 50 to 85 psig. Be aware that the maximum operating pressure for the existing chilled water underground piping is 100 psig. Any additions to this system shall be designed for 150 psig.

2.5 - AIR CONDITIONING

A. Chilled Water- A fine mesh monel or stainless steel strainer shall be installed in the chilled water supply line of each building to prevent contamination of the building chilled water system. All chilled water strainers shall have a pressure gauge installed across the strainer so as to quickly determine when strainers are fouled.

B. Air conditioning condensate lines: All air conditioning condensate lines shall be of insulated type "L" copper or approved equal.

C. Equipment surface condensation: If condensation occurs on the outside of insulated ducts, HVAC equipment, VAV boxes, flex ducts, piping, etc. during the construction period, the Project Team shall take immediate action to determine the reasons, and initiate corrective action. Substantial Completion shall not be approved until corrections are completed. The contractor shall be required to rework the insulation until satisfactory if condensation occurs on any cold surface at any time during the warranty period.

D. Chilled water system taps: All chilled water taps into the Central Chilled Water System shall be made without system interruption, where feasible. Each juncture shall be provided with a shut off valve and valve box for easy access. Note that much of the existing underground Chilled Water System piping is constructed of asbestos bearing material, i.e. Transite. "Hot tapping" details will be provided by the University. All chilled water connections, whether external or internal, must be coordinated with and approved by the Utilities Section. Initial coordination concerning the approved location of new connections must be done prior to completion of the Schematic Design Phase.

E. Exterior chilled water piping: shall be schedule 40 black steel with welded joints. The use of pre-insulated black steel pipe is permissible. Contact Director of Utilities & Engineering Services for currently approved types and manufacturers.

F. Chilled water pipe insulation (field insulated): Above grade shall consist of foamglas that is covered with a .016 inch thick aluminum weatherproof jacket that has a factory applied integral vapor barrier. The foamglas shall be glued to the piping. Fasten with aluminum bands located not

more than 12 inches apart. Insulation below grade shall be foamglas with Pittwrap cover. Piping 2" or less in a mechanical room may be insulated with Armaflex. All elbows should be void free. In general a pre-formed or 3 three sectioned mitered elbow should be sufficient. All insulation must be installed as to be a continuous system.

G. Variable flow chilled water requirement: All building chilled water systems served from central chilled water shall be designed to have variable flow characteristics compatible with the central system.

H. Chilled water shutoff valves: All chilled water piping shall be installed with shut-off valves at each floor and at each AHU. Valves 2" and smaller should be a ball valve with 316S SS ball and teflon seats. Larger valves should be butterfly valves.

I. Chilled water coil temperature rise: All major air handling unit coils shall be designed for not less than 15 degrees Fahrenheit temperature rise, and be provided with two way control valves.

J. Fan coil ventilation air: If fan coils are approved for use, they shall be provided with ducted, pre-conditioned ventilation air if feasible. The direct connection of un-conditioned ventilation air to fan coil units is generally prohibited.

K. Interior of air handling units: A/C Air Handling Units shall be double wall construction with a solid inner liner (no insulation exposed to airstream).

L. Internal vibration isolation: Air Handling Units shall have fans mounted on internal vibration isolators (2" static deflection).

M. Drain pan: Air Handling Units shall have stainless steel double wall insulated drain pan.

N. Air handling units installed in spaces exposed to outdoor air conditions: (such as attics) must be sufficiently insulated to prevent surface condensation.

P. Classroom ventilation: In classrooms, the HVAC system shall provide an adequate rate of fresh air in compliance with the Florida Energy Code. Where feasible, ventilation strategies shall be utilized to reduce ventilation air under conditions of reduced occupancy.

Q. Air Handling Units: Fan-wall systems are preferred, where appropriate. The fan management system for fan wall air handlers shall be approved by the Director of Utilities & Engineering Services.

R. **Hydronic System:** Circuit setters and pressure independent control valves shall not be used without approval of the Director of Utilities & Engineering Services.

2.6 - FUME HOODS

A. General: Due to safety and energy consumption implications of fume hoods and the constantly changing technology, the University has not established standards for fume hoods. Each installation shall be coordinated with the Project Manger and approved by Environmental Health and Safety and the Utilities & Engineering Services Director. In general the intent is to use hoods that can provide a minimum of 100 fpm face velocity and to provide remote monitoring of the sash position through the campus energy management system.

B. System Type: All fume hood flow control devices shall be of the blade style.

C. Performance: Fume hoods shall meet the following performance requirements: Supplier to provide factory ANSI/ASHRAE 110-1995 test of hood. Hood to have a rating of 4.0 AM 0.01 using the above test. Hood to be tested using ANSI/ASHRAE 110-1995 after installation in lab (testing to be provided and paid for by the hood supplier) and shall achieve a rating of 4.0 AI 0.05. If the hood does not achieve the rating, and the CFM and static pressure meet the supplier performance data, the fume hood supplier shall be responsible for any system changes and upgrades needed to achieve the "as-installed" rating.

2.7 - REFRIGERANT MANAGEMENT REQUIREMENTS

A. General Requirements

1. The contractor and mechanical engineering design professionals shall work with the Director of Facilities Maintenance, to identify specific requirements for each project and interpret requirements from this section as they pertain to upcoming work.
2. Mechanical engineering design professionals shall incorporate the requirements of this section in their equipment and contract specifications.
3. Contractor shall be responsible and accountable for compliance with the EPA Clean Air Act (CAA) Section 608, 40 CFR Part 82 and any state and local codes for all refrigerant-related work. Contractor shall ensure that all contractor employees are made aware of the content of these practices prior to beginning work on refrigerant containing equipment.
4. Contractor shall provide only proper level EPA certified technicians using EPA certified and registered recovery/recycle units to perform work on FO&M refrigerant equipment.

2.8 - BUILDING AUTOMATION AND CENTRAL MONITORING SYSTEMS

Contact the campus Director of Utilities & Engineering Services for the current requirements at the beginning of the Design Development Stage of the project.