235000 Central Heating Equipment

Sections Included In This Standard:

1.1 General
1.2 Boilers
1.3 Heat Exchangers / Coils
1.4 Other Heating System Equipment

1.1 GENERAL

A. EQUIPMENT ACCESS:
   a. All equipment that supports the facility shall be located so as to be accessible for maintenance. It is unacceptable that architectural or unrelated equipment demolition be required for removal of equipment that supports the facility.
   b. Disassembly of equipment in order to install it is also not allowed.
      i. If equipment comes disassembled from the factory with specific assembly instructions that is allowed.
   c. Manufacturer recommended services access shall be the minimum.

B. 100% redundancy is required for Heating Hot Water systems for Labs, Research facilities and facilities that house animals

1.2 BOILERS

A. APPLICABLE DESIGN CODE

1. All installations shall be designed, constructed, inspected and stamped in accordance with the current ASME Code, all State of Florida Boiler laws and rules and Insurance mandates.
   a. Boilers used in closed loop systems shall have an H stamp.
   b. Boilers used for domestic hot water boiler system shall have an HW stamp.

2. All boilers shall bear the National Board Stamping and the manufacturer's N.B. numbers as registered with the National Board of Boiler and Pressure Vessel Inspectors. A copy of the Manufacturer's Data Report signed by the manufacturer's representative and the National Board Commissioned Inspector employed by the Authorized Inspection Agency shall be submitted to the A/E for submittal to UF prior to Substantial Completion.

3. ASHRAE/IES 90.1 Compliance: Boilers shall have minimum efficiency in accordance with requirements in Ch. 6 of ASHRAE/IES 90.1.

4. Building Automation System Interface: Factory install hardware and software to enable building automation system to monitor, control, and display boiler status and alarms

~~5.~~ A [BACnet] communication interface with building automation system shall enable building automation system operator to remotely control and monitor the boiler from an operator workstation. All monitoring and control features, which are available at the local boiler control panel, shall also be available at the remote operator workstation through the building automation system. ~~All boilers shall have the~~

~~capability to connect to the BAS system via Bacnet.~~

6. Gas Train: Integral combination gas valve with manual shutoff and pressure regulator required for gas applications

7. Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.

8. Install gas-fired boilers according to NFPA 54

B. VENTING KITS

1. Kit: Complete system, ASTM A959, Type 29-4C stainless steel pipe, vent terminal, thimble, indoor plate, vent adapter, condensate trap and dilution tank, and sealant.

2. Combustion-Air Intake: Complete system, stainless steel pipe, vent terminal with screen, inlet air coupling, and sealant.

C. CONDENSATE-NEUTRALIZATION UNITS

1 Description: Factory-fabricated and assembled condensate-neutralizing [tank] assembly of corrosion-resistant plastic material with threaded or flanged inlet and outlet pipe connections. Device functions to prevent acidic condensate from damaging drain system. It is to be piped to receive acidic condensate discharged from condensing boiler and neutralize it by chemical reaction with replaceable neutralizing agent. Neutralized condensate is then piped to suitable drain.
2 Utilized where boiler is elevated or where tank is installed in a pit with tank top flush with floor.
3 Top easily removed for neutralizing agent replacement.
4 Internal baffles to channel flow for complete neutralization.
5 Integral bypass to prevent condensate backflow into appliance.
6 Multiple units may be used for larger capacity.

D. POWER PIPING

1. Piping external to power boilers from the boiler to the first stop valve of a single boiler, and to the second stop valve in a battery of two or more boilers is subject to the requirements of Section 1 of the ASME Code, and the design, fabrication, installation and testing of the valves and piping shall be in accordance with ANSI B31.1.0, as adopted and incorporated by reference.
2. Welded piping is subject to the ASME Code requirements for proper code certification including stamping in conformance with the code and furnishing of applicable Manufacturer's Data Report forms to the A/E for submittal to UF prior to Substantial Completion.

C. BUILDER REQUIREMENTS

1. Builder shall complete State Fire Marshal form CSD-1, documenting properly the boiler startup, and present to UF Facilities Services as a requirement of Substantial Completion. One copy of the completed form CSD-1 shall also be included in the Builder's O&M Manuals.
2. Install floor-mounted boilers on cast-in-place concrete equipment base(s)
3. When installing piping adjacent to boiler, allow space for service and maintenance of condensing boilers. Arrange piping for easy removal of condensing boilers.

4. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas-train connection. Provide a reducer if required.
5. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve, and union or flange, on the boiler side, at each connection.
6. Install piping from safety relief valves to nearest floor drain.
7. A drain line, with valve, shall be installed that allows for complete draining of the boiler.
8. Testing Agency, Contractor: Engage a qualified testing agency to perform tests and inspections.

E. TRAINING

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain boilers.
2. Train personnel in operation and maintenance and to obtain maximum efficiency in plant operation.
3. Provide instructional videos showing general operation and maintenance that are coordinated with operation and maintenance manuals.
4. Obtain Owner sign-off that training is complete.
5. Boiler manufacturer shall provide all programming information, passwords, setup tools required to repair any boiler issue.
6. Owner training shall be held at Project site.

F. Manufactures : Preferred: Lochinvar, AERCO Not allowed: Patterson Kelly,

1.3 HEAT EXCHANGERS / COILS

A. GENERAL

1. Swimming Pools: Shell and tube shall be 316 Stainless Steel only.

2. Heating Hot Water: Shell (Standard) and tube with copper tube.

3. Chilled Water: Shell and tube or plates. 316 Stainless Steel tubes or plates.

4. Process Water: Plate and Frame Heat exchanger with stainless steel plates.

5. Chilled Beams: Plate and Frame Heat exchanger with stainless steel plates.

B. EQUIPMENT COOLING: Domestic potable water shall not be used as a once-through cooling agent for equipment cooling as a primary source. Equipment cooling shall be accomplished using properly designed heat exchangers connected to the chilled water distribution.

a. The use of Domestic water as a secondary/backup cooling source is possible for certain critical processes with written approval from Facilities Services.

C. HEATING HOT WATER HEAT EXCHANERS

a. It is preferred to have two heat exchangers.
    i. At a minimum these heat exchangers shall be sized to support 60% of the building load.
    ii. For critical buildings they maybe required to be sized for 100% of the building load.
b. Each heat exchanger shall have the capability of running independent of the other

i. Independent control valves
ii. Separate condensate traps

D. STEAM COILS: Are not preferred. Designs using Steam Coils need to be approved in writing by Facilities Services. ~~Design Pressure: Design steam coils for 30 psig maximum. Provide reducing stations as required.~~

CHILLED WATER COILS

1. Coil Design Requirements: Design chilled water coils for a minimum of 18 degree Fahrenheit temperature rise ("Delta T") for Air-Handlers and a minimum and 20 degree Fahrenheit rise for Preconditioned outside air. Design for chilled water supply temperature available of 44 degrees F from the particular chiller plant. Select the most appropriate mix of options and strategies to satisfy the Delta T requirement.
    a. All other design parameters (CFM, Room temperatures) need to be met while keeping the Delta T.

2. Provide inlet and outlet pressure gauges (for Delta P).
    a. Pipe size for gauges should be ½".
    b. An isolation valve shall be installed to isolate gauges.
    ~~c. Include a method to verify inlet and outlet pressures of coil, control valves and strainers (e.g. Petes Plugs).~~

3. Provide inlet and outlet thermometers and wells (for Delta T).
    a. Pipe size for gauges should be ½".
    b. An isolation valve shall be installed to isolate gauges.
    ~~c. Include a method to verify inlet and outlet Temperatures of coil (e.g. Petes Plugs).~~

4. Provide access for inspection or calibration of temperature or pressure devices.

6. Coil Drains
    a. All chilled water coils shall have properly installed drains that allow for full drainage of the system.
    b. Must include a full open valve with a capped hose connection.

7. Coil Air Vents:
    a. Only brass type automatic air vents piped to a drain shall be used.
    b. Shall include an Isolation Valve.

8. For CHW coils, select coils such that heat transfer performance is maintained down to 25% of design CHW flow and provide supporting documentation

9. All chilled water coils are to have "Y" strainers with blow down valve and plug installed in the supply water side to the coil. This blow down valve shall be accessible with normal ladders or removal of ceiling grid.

F. HEATING HOT WATER COILS

1. Coil Design Requirements: Design hot water coils for a minimum of 20 degree Fahrenheit temperature rise ("Delta T") for Air-Handlers, and a minimum of 30 degree Fahrenheit rise for Preconditioned outside air. Design for hot water supply temperature available of 140 degrees F from the particular heat exchanger.

2. Provide one ~~inlet and outlet~~ pressure gauge~~s (for Delta P). (water flow, outlet gauge downstream of control valve~~) Pressure gauge to be located between circuit setter and isolation valve.

3. ~~Provide inlet and outlet thermometers and wells (for Delta T). Include a method to verify inlet and outlet pressures of coil, control valves and strainers (e.g. Petes Plugs)~~ For Heating Hot water coils thermometers or wells are not needed.

4. Provide access for inspection or calibration of ~~temperature or~~ pressure testing devices.

5. Prohibition of Dissimilar Piping: There shall be no mixing of piping. The entire piping system shall be copper piping throughout. (If dissimilar metals are used, need to use dielectric waterways). Dielectric unions are prohibited

6. Coil Drains
   a. All chilled water coils shall have properly installed drains that allow for full drainage of the system.
   b. Must include a full open valve with a capped hose connection.

7. Coil Air Vents:
   a. Only brass type automatic air vents piped to a drain shall be used.
   b. Shall include an Isolation Valve.

8. All heating hot water coils are to have "Y" strainers with blow down valve and plug installed in the supply water side to the coil. This blow down valve shall be accessible with normal ladders or removal of ceiling grid.

1.4 OTHER HEATING EQUIPMENT

A. EXPANSION TANKS – HEATING HOT WATER:

1. Designed and built in accordance with ASME BPV Code Section VII, Division 1
2. Installation: vertical and horizontal
3. Shell: Carbon Steel
4. System Connection: Top mounted carbon steel MNPT connection with flexible internal flow tube.
5. Tanks with replaceable bladders shall have high quality butyl rubber bladders.
6. Maximum acceptance volume is approximately 90% of the tank capacity.
7. Standard factory pre-charge

END OF SECTION