

## 23 80 00 Decentralized HVAC Equipment

Revision 01/04/2019

### Purpose:

The Architect and/or Engineer shall incorporate the Rice specific requirements indicated in this standard's section into their design. The Architect and/or Engineer shall further produce project specifications in line with industry standards that are updated to reflect these Rice specific requirements.

### **1. General Design Standards**

- a. In early design development phase, the Architect/Engineer must request approval from the Rice Project Manager, for the intended types of HVAC systems to be used for each area, or type of area for a project.
- b. Outdoor design temperature shall be most recent edition of ASHRAE weather data for Hobby Airport with 99% heating and 1% cooling categories used. Indoor temperature shall be per 01.05.00 Environmental Standards.
- c. All MEP systems shall use BACnet interfaces and communications and be fully integrated per ASHRAE "Standard 135-2016 -- BACnet®--A Data Communication Protocol for Building Automation and Control Networks"
  - i. Integrate BAS to lighting control system for occupancy monitoring and interactivity. HVAC zones shall be matched to lighting zones (grouped) with each HVAC zone provided with a separate time of day schedule.
- d. Rice preference is the use of single duct VAV with hot water reheat coils. Other systems are acceptable with Rice Project Manager approval during design.
- e. Terminal Box Reheat Coil Isolation Valve
  - i. An isolation valve shall be installed downstream of the balancing valve on the HHW supply side to allow for isolation of the coil without need for rebalancing.
- f. 277V Single motors are not permitted for use on FCUs or other terminal units. 120V is Rice preference.
- g. Use of 24V control wiring to terminal unit controllers in lieu of 120V acceptable upon Rice Project Manager approval.
- h. Typical Rice University system configurations:
  - i. Classrooms
    1. Single zone fan coil units (one zone per classroom).
    2. Single duct VAV.
    3. Sound limited to 40 dba.
    4. Provide wall or duct mounted indoor air quality sensors to monitor CO<sub>2</sub> levels within space, with visual display on thermostat. See Section 25 00 00 Integrated Automation for more information. Such CO<sub>2</sub> sensors shall be located in all "high use" density areas such as lecture halls and conference rooms.

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- ii. Dormitories
  - 1. Approved Manufacturers:
    - a. International
    - b. Trane
    - c. Daikin
  - 2. Single zone fan coil units (one zone per residential unit).
  - 3. Systems that return air from multiple residences shall be avoided.
- iii. Science Labs
  - 1. Single zone air units (one unit per Lab, with separate pressurization control air unit).
  - 2. Central outside air make-up unit with VAV pressurization and temperature control for each lab.
- iv. Offices
  - 1. Thermostatic zones should be arranged by exposure and common heat gain/loss. (No more than three (3) offices per thermostat/zone.)
  - 2. Single duct VAV with hot water reheat coil is the Rice standard.
  - 3. Sound limited to 40 dba.
- v. Residential Dwellings (Magister and R/A living areas)
  - 1. Single zone DX air units with suitable zone control for the application.
  - 2. Magister Houses provide separate D/X units for the First floor and the Second floor.
- vi. Equipment Areas (Electrical, Telephone, Elevator Equipment, IT Rooms)
  - 1. Primary cooling shall be from a separate CHW water cooled FCU serving the specific area only. Provide a space thermostat attached to the BMS.
    - a. Provide ½-ton of cooling per rack in IT Rooms (minimum of one ton).
    - b. Provide remote monitoring and alarming from each such FCU associated with the building BMS.
- vii. Data Centers
  - 1. Packaged Computer Room Air Units (PCRU's)
    - a. Units may include:
      - i. Electric infrared reheat.
      - ii. Electric humidifiers.
      - iii. High Efficiency filters.
      - iv. Stand-alone, or site wide controls.
      - v. Redundant cooling coils (Chilled Water primary with direct expansion back-up).
      - vi. N+1 air system redundancy.
    - b. Verify temperature, humidity, and redundancy criteria with the Rice Project Manager.
- viii. Conference Rooms
  - 1. Must provide their own zone and thermostat control.

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2. Provide wall indoor air quality sensors to monitor CO<sub>2</sub> levels within space, with visual display on thermostat. See Section 25 00 00 Integrated Automation for more information.
- i. Heat Recovery or other means of dehumidification and efficiency are encouraged, but must be economically feasible. A simple payback analysis should be given to the Rice Project Manager for approval.

### 2. **Fan Coil Unit Construction Standards**

- a. Should be as follows:
  - i. Except for residential units, fan static pressure must all for 0.3 inches W.G. loading filters.
  - ii. Filter access should be hinged.
    1. Filter rack must accept filters with adequate retention to minimize bypass air.
  - iii. Removable access panels should have fasteners retained with the panel.
  - iv. Cooling coils and heating coils must be separate.
    1. One common coil with chilled water and hot water circuits is not acceptable.
  - v. Dual wall units are preferred.
    1. "Fiber-free" internal insulation with Armaflex rubber insulation may be acceptable.
  - vi. Casing should be galvanized or painted furniture steel.
  - vii. Designer should work with the Rice Project Manager to determine whether unit should be direct drive.
  - viii. Where multiple coils are used in air units, ensure that 24 inches minimum access section is employed between coils.
    1. Each side of the coils will be accessible through hinged doors.

### 3. **Dehumidifiers**

- a. Rice preference is to use ultrasonic dehumidification systems. If steam is to be used, should be Nortec RS Series (or similar) with scale removal technology for ease of cleaning and cheaper maintenance.