

237000 Centralized HVAC Equipment

Sections Included in This Standard:

1.1 AIR HANDLING UNITS WITH COILS

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A. GENERAL

1. Intent of Standard: The intent of this standard is to ensure all equipment is designed for maintainability, minimize required maintenance, provide easy serviceable access for maintenance for all replaceable components, ensure compatibility with central chiller plant, and provide long-lasting equipment.
2. Design Calculations: Provide engineering calculations to the UF **Entity responsible for maintenance Project Manager** on the size of unit selected when requested.
3. Acceptable Manufacturers: Carrier, Trane, York, Temtrol, and McQuay.
4. UV Lights:
 - a. All new air handlers are required to be equipped with appropriately sized UV lights. Any exception to the installation of UV lights is at the Facilities Services discretion and needs to be approved in writing.
 - b. Safety interlock power switches to automatically disengage power to UV lamps shall be installed on all air handler panels or doors accessing the UV lights-section when the panel or door is opened; install identifying labels at the safety interlock switches.
 - c. If the dedicated breaker is more than 15 feet from the air handler unit, a power disconnect shall be installed and labeled with air handler (#UV Light Disconnect). This shall be in plain view and within sight of the air handler unit. Label disconnect with all connecting circuits. Install signage on all entries to air handlers where openings contain UV lights stating, "this unit contains UV lighting system – disconnect all power sources before opening or entering" and the location of electrical power disconnect and corresponding numbers representing breaker panels and breaker numbers that are associated with the dedicated UV light circuit.
 - d. Each lamp/ballast shall have a corresponding number and location schedule posted on the air handler to identify lamp/ballast placement within the unit and it will provide warranty dates.
 - e. Each lamp/ballast shall be warranted to produce UVC light at a wavelength of 200-280 Nanometer within its warranty period.
 - f. All UV lamps shall **NOT** be proprietary in nature. Replacement lamps shall be available from multiple suppliers.
5. Fan arrays are preferred over units with one single large fan.
 - a. Preferred motor size for fan arrays is no more than 10 hp
6. Internal hoist rails shall be installed in all AHUs with motors 10 hp or more.

B. ACCESS TO AIR HANDLING UNITS

1. Service Clearance: Adequate clearance shall be provided for all service, repairs and component replacements. For new buildings, the unit shall be placed such that the service personnel can freely walk to at least three sides of the unit. For renovations the unit arrangement shall be reviewed with Facilities Services.
2. Access Panels and Doors: All components (such as filters, motors, belts) requiring regular service shall be accessible without disassembly of the unit. Provide hinged access panels for filter and motor access. Hinged doors shall be able to fully open. Captive fasteners are acceptable for flat filter access. Provide hinged doors (with windows) for coils, fan, and air plenum that are large enough for easy access.
3. Devices:
 - a. Each section of an Air Handling Unit meant for access by service personnel shall be provided with at least one light fixture. One switch can operate all the lights in the Air Handler. Light Switch should be a timer switch.
 - b. One dedicated receptacle per AHU shall be installed on the outside of the AHU or on a wall within 10' of the doors.
 - c. Circuiting for such devices should be separate from other lighting and outlets building loads.
4. Floors: Floor spaces inside the AHU between coils and filter banks shall be aluminum or stainless-steel diamond plate to prevent rusting and a safe non-skid area.

C. AIR HANDLING UNIT CASING

1. Casing Material: Casings shall be galvanized sheet steel.
2. Casing Construction: Units shall have double wall construction and with an inner steel liner. All galvanized, stainless, or approved coating.

D. AIR HANDLING UNIT INSULATION

1. Provide minimum 2" thick foam insulation in all sections and components, including zone damper sections. The insulation level should be sufficient to prevent any possibility of condensation outside the unit especially if located in humid environment.

E. COILS AT AIR HANDLING UNITS: Below are specific requirements relating to air coils at air handling units.

1. CHILLED WATER COILS

a. Coil Design Requirements:

1. Design chilled water coils for a minimum of 18 degree Fahrenheit Water temperature rise ("Delta T") in Air-Handlers with return air.
2. Design chilled water coils for a minimum of 20 degree Fahrenheit Water temperature rise for Preconditioned outside air.
3. Design for chilled water supply temperature of 44 degrees F from the particular chiller plant.
4. Select the most appropriate mix of options and strategies to satisfy the Delta T requirement.

5. All other design parameters (CFM, Room temperatures) need to be met while keeping the Delta T.
 - b. Provide inlet and outlet pressure gauges (for Delta P).
 1. Pipe size for gauges should be 1/2".
 2. An isolation valve shall be installed to isolate gauges.
 - c. Provide inlet and outlet thermometers and wells (for Delta T).
 1. Pipe size for gauges should be 1/2".
 2. An isolation valve shall be installed to isolate gauges.
 - d. Provide access for inspection or calibration of temperature and pressure devices.
 - e. Coil Drains
 1. All chilled water coils shall have properly installed drains that allow for full drainage of the system.
 2. Must include a full open valve with a capped hose connection.
 - f. Coil Air Vents:
 1. Only brass type automatic air vents piped to a drain shall be used.
 2. Shall include an Isolation Valve.
 - g. For CHW coils, select coils such that heat transfer performance is maintained down to 25% of design CHW flow and provide supporting documentation.
 - h. 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.
 - i. Coiling Coils Design: Refer to Division 230500, section 2A for Local Outdoor weather design conditions.
2. Preheat Coils: Provide preheat coils on all units with more than 30% outdoor air, and elsewhere as required and protected by a freeze stat.
 - a. This is regardless of if an Energy Recovery unit is being used to preheat the outside air or not.
3. Requirements for Cleaning:
 - a) Provide a minimum of 2 feet of clearance between coil faces of both heating and cooling coils for steam cleaning access.
 - b) All construction shall be double wall with access doors to each section for access to power clean both sides of the coils.
 - c) Install all hard surfaces in air handlers and duct systems to accommodate mechanical cleaning and biocide treatment.
 - d) A potable water hose bib, 208 volt single phase 20 amp power supply shall be

located within 50 feet of the coil to accommodate a pressure cleaner and other equipment. A 110 volt single phase outlet shall be installed per section B.3.b of this standard.

4. Air Velocity Across Coils: Coil face air velocities must be limited to 450 FPM; this shall allow an increase in airflow without replacing the coils (or the entire air handling unit).
 - a. For DOAS units the maximum coil face velocities shall be 400 FPM.

F. AIR HANDLING UNIT DRAIN PANS

1. Provide stainless steel, double wall, insulated drain pans that are sloped for positive drainage. **No low spots or bellies should exist in the drain pans.**
2. Provide pans under coil, fan (only if a draw through AHU), and humidifier sections.
3. Provide intermediate pans and copper drop tubes for stacked coils.
4. Drain pans shall be drained by a trapped, insulated copper drainpipe that remains the full size (diameter) of the drain pan connection to the sanitary sewer system connection. Connection to the storm water system is not allowed. PVC drains are not acceptable.
5. Drain pans shall be designed for easy access and maintenance.
6. Drain pan shall extend from upstream of the coil face continuously to 3 feet downstream of the coil.
7. Cooling coil drain pans shall be positively sloped with multiple drain connections and piping.

G. AIR HANDLING UNIT FANS AND DRIVES

Fan Array technology shall be considered wherever continuous operation, ease of maintenance, energy-savings and size of air handlers justify the use of fan wall technology. Difference in life-cycle cost between fan wall technology and non-fan wall technology shall be developed using 10-year basis when fan wall technology is not recommended by the Consulting Engineer.

1. Airfoil fans or backward curve fans are preferred.
2. Provide high efficiency, inverter duty motors. (Refer to Section 262000 for the requirements relating to electric motors.)
3. Larger fan sets, (if approved) shall include heavy-duty belts and sheaves selected for a 1.5 service factor. The use of synchronous belts requires Facilities Services approval.
4. Provide externally accessible lubrication fittings for bearings that require lubrication.
5. Provide bearings with an L₁₀ of 200,000 hours.
6. Provide neoprene or spring type vibration isolation.
 - a. For fan array applications
 1. where motors are 5 hp or less non spring type vibration isolation should be considered.

2. Or provide fans that are balanced to BV-5 vibration level per AMCA 204.
7. Provide variable frequency drive on 3 Horsepower and larger motors.
 - a. For fan array applications (any air handler where there are 2 or more fan motors) it is preferred to have a vfd per fan motor. At a minimum there must be 2 separate vfd's to provide redundancy.
 8. Drives shall be mounted to a wall or stand.
 - a. Mounting to the interior of the AHU is not allowed.
 - b. Mounting to the exterior of the AHU is allowed when the VFD's are integral to the AHU and were shipped from the factory that way.
- H. AIR HANDLING UNIT HUMIDIFIERS: Refer to Section 238000.
- I. AIR HANDLING UNIT AIR FILTERS: Baseline requirements for air filters are given in Section 234000. The following are supplemental requirements applicable only to installations of air handling units with coils:
1. All Air Handlers shall have pre and final filter sets, in addition to Outside Air (OA) filters as needed.
 - a. If the AHU is 100% outside air (DOAS) OA filters are required and pre filters are not needed.

~~select filters according to project requirements, but not less than 90% dust spot efficiency as per ASHRAE Standards for central station AHUs.~~
 2. All Filter sections shall have a Delta Pressure (DP) gauge across them.
 - a. ~~Gauges shall meet the Differential Pressure Transmitter section of the 253000 standard. (Currently section Q)~~
 - b. ~~All filter sections shall have space between them large enough to allow for accurate DP measurements.~~
 3. Air Handlers that have outside air shall have a filter rack in this OA duct.
 - a. ~~These filters will be a minimum of 2" thick.~~
 - b. ~~Provide 4" 2" thick pleated pre-filters that are MERV 8, with a minimum 30% efficiency.~~
 4. Final Filters
 - a. ~~Shall be a minimum of MERV 15.~~
 - b. ~~Final filters shall be bag type. Cartridge filters are not acceptable unless approved in writing by Facilities Services.~~
 5. ~~A Standard size filter is preferred. Standard filter sizes are 16x20; 20x20; 20x25; 16x25, 24X24, 12x24.~~
- J. AIR HANDLING UNIT CONTROLS
1. Provide all Building Automated Systems (BAS) monitoring and control points required. Refer to Division 25 of the UF Design and Construction standards.

2. Direct Digital Controls (DDC) are required. Refer to Division 25 of the UF Design and Construction standards.
3. Provide two-way chilled water control valves when units are served by Campus central chilled water plants.
4. Cooling coil controls shall be sequenced to allow dehumidification to be performed by one part of the coil before the entire coil is activated. This allows proper dehumidification during partial load operation.
5. Design space relative humidity to less than 60 percent.
6. Control valves for air handling unit coils selected with the following fail position:
 - (a) CHW coil control valves fail open.
 - (b) HHW coil control valves fail closed.
 - (c) Preheat coil control valve fail open.
 - (d) Precool coil control valves fail open.

K. INSTALLATION OF AIR HANDLING UNITS

1. Locate AHUs in mechanical rooms, never above ceilings.
2. Mechanical rooms for AHUs shall be full height.
3. No rooftop AHUs are allowed without written permission from Facilities Services.
4. Provide sufficient space for pulling coils and shafts.
5. Mechanical rooms for AHUs shall not be vented or mechanically ventilated with outdoor air.
 - a. It is preferred AHU's be placed in conditioned spaces.
6. Service drains are preferred in all AHU sections. These drains do not need a trap and shall be valved off.
7. Mount AHUs on concrete pads or galvanized steel stands at least 6" above finished floor.
 - a. AHU's that are supplied with a skirt installed will have to be elevated up off the concrete service pad by installing 1-inch Isomode Pads between the frame and service pad so air can move freely under the AHU.
 - b. AHU's that come with a frame or installed on a frame will require 1-inch Isomode Pads between the frame/frame legs and the concrete flooring.
8. Provide a flow measuring device for each chilled water and heating hot water coil.

9. Electrical disconnects and safety switches shall not be mounted on AHU casings.
 - a. Exception is UV light interlock switches
10. Provide electronic temperature sensor (RTD or thermistor in thermal well) connected to the building EMCS in each air-handling unit's chilled water return piping.
11. Any AHUs that do not come from the factory assembled or any AHU that needs to be taken apart to be installed shall be pressure tested after assembly in final location.
 - a. Test pressure and allowed leakage rate shall be per the AHU manufacturer.

L. DUCTING OF AIRHANDLERS

1. All AHUs that are a mix of fresh air and return air where the fresh air is 20% or more of the total air shall have an air mixing section before the first coil to ensure mixing of the return and fresh air.

END OF SECTION