PART 1:  GENERAL

1.01 RELATED SECTIONS

A. Section 15790 – Coils
B. Section 15885 – Air Cleaning Devices and Filters
C. Section 15955 – Building Automation and Control System Guidelines

1.02 SUMMARY COMMENTS

A. The University previously used a dry air cooling coil lay-up strategy as a means of providing freeze protection of cooling coils without the use of glycol solutions. With the advent of better digital controls, improved preventive maintenance and enhanced air handling system designs, it is now recommended to have all chilled water cooling coils protected against freezing without having to seasonally drain and refill cooling coils. The consultant shall carefully design the air handling system to avoid stratification in mixed-air systems, provide glycol preheat coils and adequate controls to monitor and prevent coil freezing.

B. All air handlers shall be carefully designed to eliminate stratification of air that can cause cooling coil freeze-up during the winter season. Ensure the unit is provided with sufficient devices and controls to prevent cooling coils from freezing.

C. The potential for moisture carry-over shall be carefully considered for all air handling units provided with a cooling coil. Generally, it is recommended to design the equipment for a maximum coil face velocity of 475 fpm.

D. Unit performance shall be certified in accordance with ANSI/AHRI Standard 430, “Performance Rating of Central Station Air-Handling Units.”

E. Air performance of all moving devices shall be rated in accordance with ANSI/AMCA 210, “Laboratory Methods of Testing Fans for Aerodynamic Performance Rating” and shall be licensed to bear the AMCA certified rating.

F. Maximum sound levels at discharge, return and casing shall be provided to Facilities Engineering for approval during the schematic design phase. Fans shall be tested according to ANSI/AMCA 300, “Reverberant Room Method for Sound Testing of Fans” and shall comply with AMCA 301, “Methods for Calculating Fan Sound Ratings from Laboratory Test Data” or ANSI/AHRA Standard 260, “Sound Rating of Ducted Air Moving and Conditioning Equipment.”

G. The Consultant shall include in the specifications a requirement for equipment leakage testing by the air handling unit manufacturer once assembled on site with all penetrations in place and sealed. This test shall be witnessed by representatives from Cornell University and the Project Engineer of Record.
PART 2: PRODUCTS

2.01 PREFERRED MANUFACTURERS

A. Custom Air Handling Unit
   1. Air Enterprise
   2. Buffalo Air Handling
   3. HAAKON
   4. MAFNA
   5. Temtrol
   6. TMI
   7. Ventrol

B. Factory Package Air Handling Units
   1. Carrier
   2. McQuay
   3. Trane

C. Deviations from these manufacturers will require prior approval by Facilities Engineering.

2.02 CONSTRUCTION

A. General: Air handling units over 5,000 CFM shall be custom units with a guaranteed maximum leakage rate of less than 1% at 8 inches of water column. AMCA certified air handlers below 5000 CFM shall typically be Factory Package (modular) units unless function and/or physical constraints require the use of a custom unit.

B. Fan Section: Draw-through units are preferred for most applications. When blow-through units are specified, ensure an appropriate means of distributing air across the entire coil face. The use of self-supported plenum fans in blow-thru applications is preferred because they promote even air distribution and velocity across the coil face. Double-width utility set fans are acceptable in blow-through applications when there is adequate fan discharge development length downstream of the fan. Self-supported plenum fans are also preferred in draw-thru applications where discharge duct configurations (associated with centrifugal utility set fans) will induce energy robbing system effect, and when duct discharge noise levels are a potential issue. The fan, motor, and drive shall be internally spring isolated on a structural steel base complete with flex connections and lateral restraint. Direct drive self-supported fans (with variable speed drives) are preferred over belt drive fans. The fan section shall have full size access door and adjacent removable panel for maintenance access. Fan sections typically have perforated inner walls for sound attenuation. All supply outlets and air intakes should incorporate factory bell-mouth transitions in the AHU wall.
C. Base Construction:

1. General: Floors shall be of double bottom construction with 4-inches of insulation between. The base frame assembly shall have a minimum of four lifting lugs per shipped section. The structural base frame shall be fitted with cross members to support all interior components. Combined floor and base rail height shall be sufficient to allow an appropriate condensate drain trap depth. Floor material shall have safety-tread surface. Both galvanized and aluminum constructions are acceptable.

2. Aluminum Construction: Base frame assembly shall be fabricated from a minimum of 3/16-inch thick aluminum plate welded at all joints and to structural members, designed for a minimum live load of 100 pounds per square foot.

3. Galvanized Construction: Base frame assembly shall be fabricated from a minimum of 8 ga. galvanized steel. The floor shall be a double bottom construction of 16 ga. galvanized steel outer panel, and 10 ga. galvanized steel inner panel.

D. Cabinet Construction:

1. General: Roof and walls shall be double wall with 2-inches of insulation between. The panels shall be unitized in such a manner as not to disturb the insulation if panels are removed. Unit construction shall incorporate thermal breaks between the inner and outer wall panels, as well as between the walls and structure. Perforated inner walls are acceptable for use in all sections except in outside air intake, cooling coil, humidifier sections and any sections after the humidifier. Both galvanized and aluminum constructions are acceptable.

2. Aluminum Construction: The outer panels shall be fabricated of minimum 0.040-inch thick aluminum. Inner panels shall be fabricated of 0.040-inch thick aluminum. Interior finish shall be smooth mill, exterior shall be a low-reflective textured mill finish.


E. Cabinet Insulation: Use of closed cell polyisocyanurate foam insulation is preferred. Insulation shall be ASTM-84 and UL 723 fire and smoke rated to a fire hazard classification of 25/50. Insulation shall meet or exceed a 3.0 pounds per cubic foot (pcf) density material rating. The insulation shall meet the erosion requirement of UL 181 facing the air stream.
F. Access Doors: Access doors shall be included between each air handler component, and shall be of the same construction as the panels described above. The doors shall have two continuous neoprene gasket seals around the entire periphery of the door. Each access door shall have a minimum of two securing latches which are also operable from inside the unit. Positively pressurized sections shall have inwardly swinging doors, while negatively pressurized doors shall swing outward. Doors shall incorporate view ports for every section.

G. Coil Sections: Coil sections shall be separated by a minimum space of 18-inches. Each coil section shall have a full size access door. Coil casings shall be fabricated from 16 ga. 304 stainless steel. Removable panels shall be located on both sides of the air handler unit, not just on the coil removal side. See Section 15790 for more specifics on coil construction.

H. Drain Pans: Double-pitched drain pans shall be fabricated from 18 ga. 304 stainless steel and shall extend the entire length of the coil section, and extend as far as possible in the direction of airflow, far enough to catch condensate at the maximum recommended coil air velocity. Drain pans shall be insulated.

I. Lights: Watertight marine lights with wire guards shall be provided in each section that provides service access. A single, externally wall-mounted switch shall be provided to control all interior lights. Switch shall have pilot light in handle.

J. Filter Section: Filter sections shall be equipped with access doors of adequate size to remove and replace the filters. A Dwyer Photohelic gauge shall be mounted on the outside of the cabinet with copper probes measuring the pressure drop across the filter section. The purpose of the analogue output is for filter load trending over the life of the filter. Two access doors are required for slide filter applications. An upstream filter installation configuration is preferable, in that the fan suction will pull the filters into the filter frame, thus providing a better seal between the filter and frame. See Section 15885 for specifics on unit filters.

K. Controls: Generally, controls shall be field mounted. See Section 15955 for specifics on recommended building and automated controls systems required for air handling units.