Division 237300
Air-Handling Units
DESIGN GUIDE

1 General

1.1 General

A. Units shall be designed with service and access in mind. This may require service platforms, ship ladders and other features to facilitate maintenance.

B. See Section 230500 regarding service requirements and equipment rooms.

2 Materials

2.1 Indoor Air Handling Units (Hydronic)

A. Construction

1. Wall and roof construction shall be minimum 2” thick, insulated double wall construction with galvanized steel outer wall and galvanized solid inner wall panel except fan sections which shall have perforated panels for improved sound absorption. Stainless steel liner shall be provided in certain applications such as units with humidification.

2. Base shall have a structural steel channel around entire perimeter with lifting bolts and shall be sufficiently high to allow trapping of coils above the floor slab.

3. Floor: Minimum 2” insulation meeting the same requirements as the wall and roof. Supported underneath with intermediate channels as required.

    a. 12-14 gauge aluminum floor with tread plate

    b. 10 gauge hot rolled with durable, corrosion resistant, slip resistant coating.

4. Floor openings larger than 12x12 shall have powder coated heavy gauge steel walk on safety grating bolted in place to support a minimum of 300 pounds.

5. Access doors

    a. Doors shall be insulated double wall construction same as described for panels above. Windows shall be provided in each access panel. Panels shall be full gasketed with replaceable gaskets.

    b. Doors shall have a minimum of 2 latches on doors up to 48” and three inches on doors through 72”. Doors shall be operable from inside and outside of unit.

    c. Doors shall be a minimum of 70” high or full height of the unit, whichever is less. Doors shall be minimum of 24” unless restricted by section width or access requirements require additional width.

    d. Doors shall swing against the air pressure-positive pressure doors shall wing in and negative pressure doors shall swing out.

    e. Test ports shall be provided at each door.

    f. Safety lock-out: All doors with access to moving parts shall be designed and meet UL 1995 mechanical protection guidelines. Equipment service shall not require tool access.

6. Finish

    a. Exterior Panel Finish (wall and roof): Polyurethane primer and polyester hybrid semi-gloss top coat, or etch bond primer and alkyd enamel top coat. All panels shall be primed and top coated on both sides.

b. Uncoated steel: All uncoated steel, including entire base structure, fan assembly (except wheel) and interior racks shall be painted to the same requirements of the panels.

c. Interior finish shall be galvanized unless conditions require special consideration for corrosion resistance such as units with humidification or labs.

B. Fans

1. Fans shall be direct drive plenum fans, arrangement 4. Class 1 fans are not acceptable.

2. Fans shall be equipped with discharge cage or safety screen.

3. Fan Arrays

a. Fan arrays shall be provided to ensure all air handling fan motors are less than 50 HP. They shall additionally be provided when some level of fan/equipment redundancy is a programmatic requirement.

b. When fan arrays are utilized:

1) 7,500 cfm and larger, fan array with minimum of two fans so that loss of a single fan provides 50% of peak airflow.

2) 10,001 to 20,000 cfm and larger fan array with minimum of two fans so that loss of a single fan provides 70% of peak airflow.

3) Larger than 20,000 cfm, N+1

4) Motor sizes limited to maximum 7.5 HP each

5) Each fan shall be equipped with its own VFD. Fans shall be selected so that drives do not operate over 60 hertz.

6) Each fan shall be provided with a low pressure drop backdraft damper and system effect shall be included in the AHU submittal.

7) Provide structural rail downstream of fan arrays with fan motors larger than 2HP and inside single fan sections to accommodate the use of a chain fall or other mechanically assisted lifting device.

C. Controls

1. Fan controls shall be wired so that loss of any fan in an array allows remaining fans to operate.

2. Each fan shall have individual motor overload protection.

3. Dampers shall be leakage class 1 and equal to Ruskin CD-50. Unit shall be provided with all linkages. Actuators shall be Belimo.

4. Each fan shall be equipped with airflow measuring cone that is piped to individual transducers. Engineer shall coordinate so that airflow totalization is provided either with the air handling or with the building automation system to indicate total airflow in the array on local display and at the BAS graphics. Coordinate with 230900.

5. For fan arrays, provide a dedicated fire alarm shutdown terminal.

D. Lights/Wiring

1. LED, vapor proof, marine fixtures in each accessible section with protective metal cage.

2. Lights shall be factory wired to a single switch on the exterior of the unit.

3. Wiring Clearances: Air handling unit manufacturer shall provide a minimum of 1.5 inch clearance above entire width of each interior bulk head (filter, coil, fan, etc.).

E. Filters:

1. Factory fabricated as an integral part of the air handling unit; multi-stage filter housing or single stage filter housing as required. Filter racks shall accommodate filtration requirements for this project as specified in Section 234000.

2. Minimum 16 gauge galvanized steel, gasketed with positive sealing fasteners.

3. Differential pressure gauge per 234000.

4. Access/Loading: Face and rear loading for filter sections are preferred when the air tunnel height is 60” or taller. Provided a minimum of 24” service clearance for face/rear loading filters. When

tunnel height does not permit face/rear loading filters, provide glide pack frame equal to Camfil Farr 4p or 3p.

F. Condensate drains: Insulated, double sloped, IAQ style, fully drainable for positive draining and cleanability. Drain pan shall be full accessible for inspection and cleaning. Stainless steel construction.

G. Water Coils

1. Copper tube, aluminum fin
2. Heating coils and chilled water coils must be 100% drainable and must have drain valves and air vents installed.
3. For all heating and cooling coils, a means of cleaning the air side of the coil shall be provided, (i.e. hinged access door and minimum 24” service plenum. Provide a minimum of 24” between coils to facilitate cleaning.
4. Stacked coils shall be provided with coil removal rails.

2.2 Outdoor Hydronic Air Handlers (Hydronic)

A. Same as indoor except:

1. Walls shall be minimum of 4” thick with minimum 4” insulation.
2. Insulated base for elevated units and slab on grade units. Insulated curb for roof mounted units unless structural conditions require piers.
3. Units located on piers will require service platforms and ship ladders for service. Unit piers need to elevated sufficiently (approximately 30”) to allow reroof without removal of equipment.
4. Units shall have sloped roof for water runoff. Water run off shall drain away from doors. Where not practical, provide rain gutter systems with downspouts to guide roof water to run-off building roof.
5. The engineer shall consider blowing snow in the design and specification of the outside air intakes. This will require weatherproof louvers and/or weatherproof hood over the intake. Intakes shall be elevated sufficiently above roof to locate above drifting snow on the roof.

6. For roof mounted equipment, provide a curbed and insulated pipe enclosure at coil connections for field installation of vertical pipe from the ceiling below. Provide access doors on pipe enclosure. Details on drawings shall indicate size.

7. Duct through unit curb with no exposed ductwork where practical.

B. Convenience outlet: a 20 amp, 115 volt, GFI electric outlet shall be provided as per the National Electric Code and shall be wired to be operational if the unit is shut off at the main disconnect.

2.3 Outdoor Packaged Units

A. Packaged units are defined as units without hydronic coils and they may include equipment with gas fired burners, heat pumps, or dx coils with condensing units.

B. Generally outdoor packaged equipment is not used on campus except potentially on very small facilities without access to campus heating and cooling utilities.

C. This section includes outdoor roof or pad mounted units with heat pumps for heating/cooling or compressors for cooling.

D. Convenience outlet: a 20 amp, 115 volt, GFI electric outlet shall be provided as per the National Electric Code and shall be wired to be operational if the unit is shut off at the main disconnect.

E. Safety controls: In all cooling package units, the cooling system shall be protected by a fusible plug, high pressure stat, with manual reset, low pressure stat, compressor motor overload, and a timing device which will prohibit the compressor motor from being subjected to a starting current more than once every five (5) minutes

3 Execution

3.1 General

A. Install in accordance with the manufacturer’s requirements.

B. Provide start-up by manufacturers representative. Training provided by manufacturer's representative. Provide copy of start-up reports in O &M Manual.

C. Demonstrate draining of coils to the Owner's representative before final water treatment is added to the system.

4 Appendix

4.1 Reserved for future content.