AHU DESIGN GUIDELINES

1.0 UNIT LAYOUT

1.1 GENERAL CONSIDERATIONS

1.1.1 Outside air should be filtered upstream of the first conditioning component with minimum 30% filters; combination 30% & 85% better.

1.1.2 Access should be considered to the upstream and downstream face of all components.

1.1.3 Approach angle and/or leaving angle between a component and an opening or other component < 45^{o}. This allows proper airflow to be developed across component.

1.2 OPENING SIZING AND LOCATIONS

1.2.1 Outside and exhaust air openings for indoor units: ~1200 - 1500 fpm; 2000 fpm max.

1.2.2 Outside air openings (outdoor units): ~350 – 450 fpm (with louvers); ~600 fpm max. (with intake hoods)

1.2.3 Exhaust air openings (outdoor units): ~650 – 750 fpm (with louvers); ~1,000 fpm max. (with hoods). Lower velocity recommended with louvers to keep noise at a minimum.

1.2.4 Return air openings: ~1200 - 1500 fpm; 2500 fpm max.

1.2.5 Supply air openings: ~1500 - 2000 fpm; 3000 fpm maximum.

1.3 CENTRIFUGAL FAN (HOUSED) APPLICATIONS

1.3.1 Fans require minimum of 24" or one wheel diameter between the downstream edge of the nearest upstream component to edge of fan inlet opening.

1.3.2 Fans require minimum 24" or 1-1/2 wheel diameters between fan discharge and nearest downstream component.

1.3.3 SWSI fans require minimum 24" or one wheel diameter between the side wall and the inlet side of the fan.

1.3.4 DWDI fans minimum 24" or one wheel diameter between the side walls and the fan inlets on both sides of the fan.

1.3.5 When using dual fans (DWDI or SWSI) and fan inlets face each other, minimum clearance between fans to be 24" or 1-1/2 wheel diameters.

1.3.6 Following types of fans have externally mounted inlet vanes and require additional clearance between the fan inlet and side walls:

- ⇒ Fans with less than 18" diameter wheel (most manufacturers)
- ⇒ Class IV fans
- ⇒ Industrial type fans
- ⇒ Fans with spark proof construction

1.4 PLENUM-TYPE (UNHOUSED) FANS APPLICATIONS (vaneaxial fan applications are similar)

1.4.1 Upstream clearance requires <45^{o} approach angle from the edge of the nearest upstream component to the edge of the fan inlet and a minimum one wheel diameter.

1.4.2 Downstream clearance requires minimum 24" or one wheel diameter from the wheel backplate to nearest downstream component.

1.4.3 Plenum fans are recommended to have minimum one-half wheel diameter from edge of the wheel to the side wall.

1.4.4 In parallel plenum fan application, fans are recommended to have a minimum one wheel diameter from edge of wheel to edge of wheel.

1.4.5 It is not recommended to locate unit discharge openings directly over the fan wheel; edge of opening should start at backplate and continue downstream. *Violation could cause flow discrepancies and/or noise problems*.

1.5 GENERAL COIL APPLICATIONS

1.5.1 Coils should be provided with > 24" between coil bank and adjacent piece of conditioning equipment. For cooling coils, this clearance is to be measured from the upstream and downstream edge of the coil drain pan.

1.5.2 Coils can be located adjacent to filter banks when face areas of the components are equal or within close proximity. In cases where face area is not equal, coils are to be located at a distance where angle between edge of filters and edge of coils is less than 45^{o}

1.5.3 For unit with coils two or more wide in a staggered arrangement, coils should be arranged so that the piping that crosses the unit is on the downstream side of the adjacent coil, in the already tempered airstream.

1.5.4 Unit width is required to be 15" greater than coil finned length to accommodate coil headers, return bends, casings, etc. When piping is expected to be included internal to the airstream with piping extended in the direction of the coil, an additional minimum 24" is required to be added to this value.

1.5.5 For cooling coils, unit height is required to be 18" greater than coil fin height (for one coil) [add 6" =fin height for each additional coil in height].

1.5.6 Steam coils require minimum 24" between coil and mounting surface to allow adequate space for trapping of coils.

1.5.7 VIFB/ IFB coils require access to both upstream and downstream sides of coil to remove or loosen header adjustment bolts.

1.5.8 Steam coils should not exceed 8'-0 nominal tube length for good steam distribution. Consider vertical installation of coil tubes for wider applications.

1.5.9 Consider use of eliminator packs or coalescing media when:

a. high condensate load (100% OA units and/or large air volumes)
b. coil fin height >36"; tall coils will tend to carryover at lower velocities
c. spiral fins in lieu of plate fin type coils
d. coil face velocity >550 FPM
e. coil is located immediately upstream of bottom discharge in unit

1.6 GENERAL FILTER APPLICATIONS

1.6.1 Filter banks (includes HEPAs) require 30" minimum clear access space on service side of filters.

1.6.2 Filter banks downstream of 90° mixing are to be located more than 12" beyond the downstream edge of the horizontal damper in the floor or roof. *High velocity turbulent airflow from mixing box may destroy filters.*

1.6.3 Final filters (includes HEPAs) should not be located immediately downstream of dehumidifying cooling coils without some means of reheat between them. *Kinetic energy changes at the filter will create localized drops in vapor pressure causing the filters to condense moisture.*

1.6.4 Carbon or gas-phase filter bank requires 36" minimum clear access space on service side of filters.

1.6.5 When applying gas-phase filters in units with steam heating; recommend maintaining high temperature limit <120°F. *Carbon media reactivates (gives up) its absorbed contaminants at 120°F. Reactivation process is more active as temperatures are elevated further.*

2.0 SERVICE AREA CONSIDERATIONS

2.1 Service corridor width should take into consideration proper clearance required by code in front of electrical devices. Clearances to stand-up and maneuver around coil piping and other devices should also be considered.

2.2 Methods to ventilate, cool, or heat the service corridor should be considered.

2.3 Combustion equipment (unit heaters, boilers, etc.) located in service corridors should be provided with a dedicated source of combustion and ventilation air. It is recommended that this equipment be vented to outside of unit not into corridor.

2.4 Service corridor should only be used as a return air plenum when negative pressure in corridor is less than 1-1/2". If corridor is used as return air plenum, exterior casing should have thermal break construction to prevent condensation inside corridor.