

NC State University Design and Construction Guidelines

Division 23 Air Handling Units

1.0 Purpose

- A. The following guidelines are provided for the selection and specification of air handling units.

2.0 General Requirements

- A. Air handlers shall be located in one or more dedicated mechanical room spaces. Roof top units (RTU's) are not acceptable.
- B. Quantity and distribution of air handlers should be aligned with building programs to minimize the operation of equipment during partial occupancy

- C. AHU capacity shall be designed based on the following parameters:

	Exterior Design Conditions	<u>Summer (DB/WB)</u>	<u>Winter (DB)</u>
1.	Animal Facilities (100% OA)	99/78	10
2.	Lab Facilities (100% OA)	96/77	10
3.	Office / Classroom Facilities (100% OA)	92/76	16

- D. Volume/temperature control dampers shall be opposed blade. All other dampers can be parallel (i.e. isolation dampers such as smoke/isolation).

- E. Economizer and Minimum Ventilation Operation

- 1. Economizer sequence shall operate by enthalpy based on adjustable set points, (not return and outside enthalpy comparison) taking into consideration an outside temperature operating range of 45 to 65°F.
- 2. The economizer sequence shall not lock out the cooling or heating valve sequence for the air handler.
- 3. The ASHRAE 62 minimum ventilation requirements shall be met by a sequence of operations utilizing the preferred, direct measurement of the outside air volume or the mathematical differential of the direct measurement of the return and supply air volumes.
- 4. During scheduled unoccupied times, office/classroom air handlers shall be put into a recirculating pattern where outside air intake dampers are closed and building exhaust fans are disabled.

- F. Filter sections shall have access doors on both sides of the filter section. A magnahelic gauge shall be mounted on the outside of the cabinet with copper probes measuring the pressure drop across each filter section.

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- G. Pre-filters shall be two (2) or four (4) inch 30% dust spot efficiency, 90% arrestance (MERV 8). Final filters shall be the box type or the bag type. A rack system shall be provided to support the bag type filters. Final filters for office/classroom applications shall be 65% dust spot efficiency, 95% arrestance (MERV 11). Final filters for lab applications shall be 95% Dust Spot Efficiency, greater than 98% arrestance (MERV 15). Where applicable to project, HEPA filters may be required.
- H. Cabinets shall be double wall construction with a minimum of 18 gauge. A full access section shall be provided between the chilled water and preheat coils. Galvanized units are preferred.
- I. Access doors with windows shall be included between each air handler component. Access doors shall be double walled.
- J. Built up or custom AHU's large enough for the interior to be accessed shall have marine-style fixtures equipped with compact fluorescents in each section. The lights shall be switched from the exterior of the AHU. Switches shall contain indicator lights.
- K. Preheat coils may be steam or hot water Hot water coils are preferred.. Steam preheat coils shall have integral face and bypass dampers, i.e. wing coil. Steam condensate from the coil shall be removed by gravity and/or electrically powered pump. Hot water preheat coils shall have circulating pumps to maintain water circulation through the coil.
- L. Coil casings shall be stainless steel. Removable panels shall be located on both sides of the air handler unit.
- M. Drain pans shall be stainless steel and shall extend the entire length of the coil section.
- N. Chilled water coils shall be selected on the basis of 44° F entering water temperature and 58° F leaving water temperature. Minimum tube velocity shall be four (4) fps at full load condition. Coils shall maintain a 14° Δ T from 100% load down to 25 % part load.
- O. All coils shall be a minimum of six (6) row construction and a maximum of eight (8) row construction. All coils shall be constructed to facilitate cleaning.
- P. Chilled water coil control valves shall be two-way, normally closed. Provide variable flow loop for the building loop. Control valves and operators shall be selected for the full possible pump head on the loop.
- Q. All AHU Chilled water control valves must be pressure independent.
- R. All coils shall have non-ferrous headers and tubing

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- S. Clearances around the unit shall provide for full width coil removal. Indicate coil removal space on the enlarged mechanical room plans and sections.
- T. Variable frequency drives (VFD) shall be used for air flow volume control. VFDs must be mounted outside the unit.
- U. Heating coil face velocities shall be targeted at 550 FPM. Cooling coil face velocities shall be targeted at 450 FPM.
- V. The discharge duct from the air-handling unit fan shall be designed to minimize airflow system effects and resulting pressure loss.
- W. The velocity in the return air, outside air, and discharge air ducts shall be held to a maximum of 1750 FPM.
- X. Belt drives shall be equipped with cog type belts.
- Y. Fiberglass materials shall not be exposed to the air stream.
- Z. Air handlers shall be set on minimum six (6) inch high concrete housekeeping pads. Slab to extend a minimum of six (6) inch beyond limits of air handlers
- AA. Air handling units sufficient in size to enter during operation must have belt guards installed in the unit.
- BB. Noise Control
 - 1. Design selection for acceptable noise and vibration control of HVAC equipment shall be in accordance with the ASHRAE Handbook-HVAC Applications, Noise, and Vibration Control.

Design shall refer to ASHRAE Handbook-HVAC Applications, 48.3, Table 1 for sound criteria based on specific room type