

SECTION 15855

AIR HANDLING UNITS WITH COILS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Central Station Air Handling Units.

B. Related Sections:

1. Section 15010 - Basic Mechanical Requirements.
2. Section 15050 - Basic Mechanical Materials and Methods.
3. Section 15240 - Mechanical Sound and Vibration Control.
4. Section 15790 - Air Coils.
5. Section 15885 - Air Cleaning.
6. Section 15990 - Testing, Adjusting and Balancing.
7. Section 09900 - Painting

1.02 REFERENCES

- A. Air Conditioning and Refrigeration Institute (ARI).
- B. National Fire Protection Association (NFPA).
- C. Underwriter's Laboratories, Inc. (UL).
- D. National Electrical Manufacturer's Association (NEMA).
- E. National Electric Code (NEC).
- F. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
- G. American National Standards Institute (ANSI).

1.03 SYSTEM DESCRIPTION

A. Design Requirements:

1. General:

- a. Factory-fabricated and factory-tested air handling units consisting of combinations of sections of fan, coils, pre-heat, filters, plenums, dampers and mixing box as required for project design conditions.
 - b. Equipment shall be of adequate size to handle air quantities and static pressure efficiently in accordance with design.
 - c. Unit performance shall be certified in accordance with ARI Standard 430 for central station air handling units.
 - d. Provide adequate clearances for servicing or removal of motors, drives, bearings, coils, filters and dampers.
 - e. Medium and high velocity draw-through and built-up systems shall have transitions to achieve velocity energy recovery.
 - f. Specify P-traps for condensate drains.
 - g. Specify full NEMA rating of electrical components.
 - h. Specify maximum sound levels at the discharge, return and from casing.
2. Variable Volume:
- a. Select discharge dampers (forward curved fans only), or variable speed drive control to best suit design conditions of air flows and static pressure in harmony with budget and energy conservation requirements for project.
3. Casings:
- a. Specify access doors that are easily openable for inspection and access to internal parts.
 - b. Specify access door handles to be safety latch type. Thumb screws are not acceptable.
 - c. Specify stainless-steel drain pans for cooling coils and humidifiers to be extensive enough to catch condensate leaving coil at highest catalogued face velocity. Bottom shall be designed to slope to drain to minimize standing water.
 - d. Condensate lines from drain pan must have deep traps to prevent either draw or blow through conditions. Specify proper depth dimension.
 - e. Specify lights with wire guards in accessible sections, factory wired to one switch mounted on casing exterior. Switch shall have pilot light in handle.
 - f. Downstream of evaporator or humidifier sections, specify marine lights with sealed wire-and-glass.
 - g. Specify viewports in evap-pad, filter, fan, damper and humidifier sections.
 - h. Specify insulation to meet NFPA-90A flame spread and smoke generation requirements.

- i. Specify double-wall construction, with perforated panels in fan section(s).
4. Fan Section:
 - a. See UCB Standards 15010-1.05 for special submittal and construction standards
 - b. The use of a two-fan wheel housing assembly in a common section can be a cause for shaft flexing due to length, and should be evaluated before specifying.
 - c. Fans selected for operation above 6 inches static pressure must be approved by the University.
 - d. Original drive sheaves shall be changed when required by balancing.
 - e. Specify solid steel fan shafts.
 - f. Specify self-aligning, pillow block regreasable ball type fan bearings for an average, L10 life of 200,000 hours at design operating conditions, per ANSI Code B3.15.
 - g. Specify externally accessible fittings for lubrication.
 - h. Fan motors shall be in accordance with "Motors" paragraph in Section 15050 - Basic Mechanical Materials and Methods.
5. Vibration Isolation: (Only if required after consultation with the University)
 - a. Specify entire fan, motor and drive assembly to be internally spring mounted at the factory, together with fan discharge flexible connection and thrust restraint springs.
 - b. Internal factory selected and installed vibration isolation is preferred over an alternate design requiring external field installed deflection springs, pipe and duct flexible connections, thrust restraint springs and spring type pipe hangers on all pipes direct connected to the unit per Section 15240-\Mechanical Sound and Vibration Control.
6. Coil Sections:
 - a. Provide for removal of coils and space coils to allow for cleaning them without removal.
 - b. Specify differential pressure gage across coils.
 - c. All other coils shall be in accordance with Section 15790 - Air Coils.
 - d. Steam coils shall not exceed 6 feet in width.
7. Damper Sections:
 - a. Bronze or nylon bearings.

- b. Blades mechanically secured to control rods.
- c. Blades with neoprene gaskets to seal against entire stop.
- d. Leakage rate not to exceed 2 percent of air quantity at 2000 fpm velocity through damper and 4 inch wg pressure difference.
- e. shall be aggregated blade type unless approved by UCCS personnel.

8. Filter Section:

- a. Capable of accepting standard 2 inch thick pre-filters and a combination of 4 inch by 24 inch and 24 inch extended-surface retained-media filters. Provide the filters in accordance with Section 15885 - Air Cleaning.

**LEED EQc3: Construction IAQ Management Plan:
Final filters must have a Minimum Efficiency Reporting Value (MERV) of at least 13, approximately an 85% efficiency.**

- b. Provide hinged access doors on both sides for filter replacement, if possible, for units wider than 4 feet.
- c. Required upstream of all coils, including heat recovery.

9. Casing Section Lengths:

- a. Indicate minimum lengths for access to filters, coils and dampers.

10. Mixing Boxes:

- a. Provide equal sized flanged openings capable of handling full air flow.

11. Zone Damper Sections:

- a. In general, multi-zone type units penalize energy conservation and should be avoided where conditioned air in cold deck is mixed with heated air.

12. Spray Coil Assemblies:

Not acceptable.

13. Direct Evaporative Cooling Section:

- a. Evaporative-cooling section shall be downstream of all coils.
- b. Specify stainless steel sumps and housings (i.e., all surfaces subjected to continuous wetting). Sump shall extend 6' upstream of face of media to avoid splashing out of the sump under low airflow conditions.
- c. Specify stainless-steel fasteners and brackets within, as well as dielectric gaskets between housing and rest of AHU.

- d. Pump shall be stainless steel with low-water pump cut-off switch in other than residential-type evaporative-cooling systems. Specify a means to disconnect the pump within the unit and an external J-box.
- e. Specify quick-fill valve within the unit, upstream of the fill float valve. The quick-fill shall have a ball valve with stainless-steel ball, stem and handle, and a brass male hose connection. The discharge of the float valve shall be above the level of the overflow drain. On design drawing, specify P-trap for sump drain.
- f. Specify copper water-distribution header with flushing valve(s) at each end. Valve shall be full-port with stainless-steel ball, stem and handle and a brass male hose connection. Header supply shall have a flow-control valve with locking handle. Provision for water bleed-off is necessary only if sump automatic drain-down is not used.
- g. Specify automatic controls to schedule daily drying-out of evaporative media and weekly sump drain-down. In exterior applications, specify automatic drain-down to avoid freezing.

14. Indirect Evaporative Cooling

- a. Is encouraged, either where direct evaporative cooling is being designed or in conjunction with backup/complementary "mechanical air-chilling" coil.
- b. Chilled water from an absorption chilled-water source may be considered an indirect-cooling coil equivalent when used in conjunction with direct evaporative cooling, and chilled water temperature is controlled by supply air temperature.

15. Humidifiers:

- a. When required, specify steam grid type to inject steam into air stream. Do not use steam from Central Plant.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of packaged air handling units with characteristics, sizes, and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards: Comply with the following:
 - 1. ARI Compliance: Test and rate air handling units in accordance with ARI 430 "Standard for Central-Station Air Handling Units", display certification symbol on units of certified models.
 - 2. NFPA Compliance: Provide air handling unit internal insulation having flame spread rating not over 25 and smoke developed rating no higher than 50; and complying with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".
 - 3. UL and NEMA Compliance: Provide electrical components required as part of air

handling units, which have been listed and labeled by UL and comply with NEMA Standards.

4. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to installation and electrical connections of ancillary electrical components of air handling units.
5. ASHRAE Compliance: Construct and install refrigerant coils in accordance with ASHRAE 15 "Safety Code for Mechanical Refrigeration.
6. ASHRAE-compliant and UL-approved filters.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

(Specify only those units with similar quality.)

Aerosonics
ClimateCraft
Dunham-Bush
Energy Labs
Governair
Mammoth
McQuay
Pace
Temtrol
Trane
United Metal
York

PART 3 - EXECUTION

3.01 APPLICATION/INSTALLATION

- A. In general, for project specifications, remove "Design Requirements" sub-paragraph A in Part 1, paragraph 1.03 "System Description" of this Design Guide and use list to expand on specific project applications in Part 2 - Products and specific installation requirements in this Part 3 for each unit specified.
- B. Specify that AHU's shall be started only when authorized by UCB staff.

END OF SECTION

