

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes variable-volume, central-station, custom air-handling units with coils for indoor installations.

1.2 SUBMITTALS

- A. Shop Drawings: Signed and sealed by a qualified professional Engineer.
 - 1. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
 - 3. Submit written certification for air handling unit that unit is installed in accordance with manufacturer's requirements. This certification shall be furnished upon completion of re-assembly of units on site.
- B. Coordination Drawings: Submit with Shop Drawings. Show mechanical room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.

1.3 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filters: One set for each air-handling unit.
 - 2. Gaskets: One set for each access door.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Energy Lab.
 - 2. Pace; York International Corporation.
 - 3. Climate Craft.
 - 4. Aaon
 - 5. Or approved equal.

2.2 MANUFACTURED UNITS

- A. Central station air-handling units shall be factory assembled and consist of fans, motor and drive assembly, coils, damper, plenums, moisture eliminators, final filters, condensate pans, mixing dampers, control devices, and accessories. Provide fully weatherproofed construction and supported steel base.
- B. Each section with access door shall have marine water light wired to an individual switch. All fan sections will have marine lights and 115 V utility receptacles.

- C. Unit Cabinet: Unit panels shall be constructed of 16-gage mill G90 galvanized steel with a 20 gage galvanized steel liner (double walled) in the entire unit. The unit housing side and roof panels shall be constructed of 16-gauge galvanized steel, and shall utilize a standing seam modular panel type construction. Casing shall have 2" minimum thickness dual-density fiberglass insulation with a density of not less than 3 lbs per cut ft. Unit floor is to be covered with 0.125" thick Aluminum #3003 treadplate. All floors shall be insulated from below using minimum 1" thick foam to insure that the entire under surface of the floor is insulated
- D. Fabrication: Drain pans shall be provided under all cooling coils. The drain pan shall be fabricated from 15 gauge 304 stainless steel. All pans are to be sloped for complete drainage with no standing water in the unit. They shall be insulated minimum 3-inch "Double Bottom" construction with welded corners.

2.3 COILS

- A. Tested at 350 psig air pressure and performance is to be certified under ARI Standard 410. Coils exceeding the range of ARI standard rating conditions shall be noted.
- B. Cooling coils shall be mounted on stainless steel support rack to permit coils to slide out individually from the unit. Provide intermediate drain pans on all stacked cooling coils. The intermediate pan shall drain to the main drain pan through a copper downspout. Water coils shall be constructed of seamless copper tubing mechanically expanded into fin collars. All fins shall be continuous within the coil casing to eliminate carryover inherent with a split fin design. Fins are die formed Plate type.
- C. Headers are to be seamless copper with die formed tube holes.
- D. Coil Construction: rigidly supported across full face, pitched to allow drainage.
 - 1. Fins: 0.006" Copper mechanically bonded to tubes.
 - 2. Tubes: 5/8" OD Seamless copper, 0.025 inches wall thickness.
 - 3. Coil Casing: Stainless steel.
 - 4. Headers for Water Coils: Steel, cast iron, or copper with connections for drain valve and air vent, and threaded piping connections.

2.4 FILTER SECTION

- A. Filter Gauges: Provide and flush mount Dwyer 2000 Magnehelic air filter gauges, or approved equal. Static pressure tips, shut off valves and tubing shall be provided and installed by the unit manufacturer. One Magnehelic gauge shall be provided for each pre and final filter bank.

2.5 ECONOMIZER SECTION

- A. Economizer section shall be complete with low leakage dampers with airfoil blades. Flat or formed metal blades are not acceptable. The damper blade shall incorporate rubber edge seals and zinc plated square steel shaft for a non-slip operation. Shaft bearings holes shall be N.C. machine punched and fitted with one inch O.D. heavy duty nylon bearings to eliminate friction and any metal to metal contact. Damper jamb seals shall be stainless steel spring arcs designed for a minimum air leakage and smooth operation. Damper linkage shall be concealed within a 16 gauge G-90 galvanized steel frame parallel blade type dampers.

B. Moisture Eliminators

1. Equip outside air intakes with moisture eliminators. Eliminators shall consist of a filter frame and drainable filter media. Construct of minimum 24 gage stainless steel, removable through the nearest access door in the casing or ductwork. Eliminators shall not have less than two bends at 45 degrees and shall be spaced not more than 2-1/2 inches center-to-center on face. Each bend shall have an integrally formed hook as indicated in the SMACNA DCS. Moisture eliminators shall be installed in side-slide tracks.

2.6 ELECTRICITY, POWER PACKAGE AND CONTROLS OPTIONS

- A. Variable frequency drives shall be factory furnished and installed by the air handling unit manufacturer.
- B. Vapor-proof lights fixtures shall be wired to individual switches and provided in each fan section. There shall be a plug receptacle in each fan section.
- C. Provide weatherproof, 15 amp, GFIC receptacle and locate outside the supply fan section.
- D. Single point wiring to include input power disconnect switch and separate disconnect switches for VFDs for supply and return fan motors. Provide stepdown transformer and wiring to provide input power to lights and plug receptacles.
- E. DDC Controls, temperature, and pressure sensors shall be shipped by others to the air handling unit factory for mounting.
- F. All components shall be UL approved.

2.7 TEST CONDITIONS AND APPLICABLE STANDARDS

- A. All sound power level measurements and calculations shall be made in accordance with AMCA Standard 300-96, Test Code for Sound Rating, and AMCA Standard 301-90, Method for Calculating Fan Sound Ratings from Laboratory Test Data. ARI 350 can be substituted, where applicable, but must be approved by the Acoustical Consultant. However, all reported data must be octave band sound power from 63 to 8000 Hz. When noise data is submitted, the specific installation type used for the measurements, as detailed in AMCA 300-96, shall be explicitly stated. Equivalent test and calculation procedures may be substituted for the above procedures.

2.8 SOUND DATA SCHEDULE

Equipment	Sound Power Level (dB re 10 ⁻¹² W) at							
	Octave Band Center Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
AH-1 Supply								
AH-1 Return								

PART 3 - EXECUTION

3.1 GENERAL

- A. Install per Engineer and manufacturer's requirements to maintain warranty.

3.2 COMMISSIONING

- A. Manufacturer's Field Inspection: Engage a factory-authorized service representative to perform the following:
 - 1. Inspect field assembly of components and installation of central-station air-handling units including piping, ductwork, and electrical connections.
 - 2. Prepare a written report on findings and recommended corrective actions.
- B. Final Checks before Startup: Perform the following before startup:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connection for piping, ductwork, and electrical are complete. Verify that proper thermal overload protection is installed in motors, starters, and disconnects.
 - 3. Perform cleaning and adjusting specified in this Section.
 - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify free fan wheel rotation and smooth bearings operations. Reconnect fan drive system, align belts, and install belt guards.
 - 5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
 - 6. Set zone dampers to fully open position for each zone.
 - 7. Set face-and-bypass dampers to full face flow.
 - 8. Set outside-air and return-air mixing dampers to minimum outside-air setting.
 - 9. Comb coil fins for parallel orientation.
 - 10. Install clean filters.
 - 11. Verify that manual and automatic volume control, and fire smoke dampers in connected ductwork systems are in fully open position.
- C. Starting procedures for central-station air-handling units include the following:
 - 1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm.
 - a. Replace fan and motor pulleys as required to achieve design conditions.
 - 2. Measure and record motor electrical values for voltage and amperage.
 - 3. Manually operate dampers from fully closed to fully open position and record fan performance.
- D. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for air-handling system testing, adjusting, and balancing.

3.3 DEMONSTRATION

- A. Engage the services of a factory-authorized service representative to train the University's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
 - 1. Review data in the operation and maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
 - 2. Schedule training with the University, through Design/Builder, with at least 7 days' advance notice.

END OF SECTION