

SECTION 23 74 00 - CENTRAL STATION HVAC UNITS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Indoor Air Handling Units. AHU E1 & E2.
- B. Indoor Return Fan RF - E1 & E2.

1.2 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AMCA 99 - Standards Handbook.
- C. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- D. AMCA 300 - Test Code for Sound Rating Air Moving Devices or AHRI 260 sound rating of ducted air moving and conditioning equipment. For stand alone return air fans AMCA Standard 301 is acceptable.
- E. AMCA 500 - Test Methods for Louver, Dampers, and Shutters.
- F. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.
- G. AHRI 430 - Central-Station Air-Handling Units.
- H. AHRI 435 - Application of Central-Station Air-Handling Units.
- I. ASTM B117 - Standard Practice for Operating Salt Spray Apparatus.
- J. NEMA MG1 - Motors and Generators.
- K. NFPA 70 - National Electrical Code.
- L. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- M. UL 723 - Test for Surface Burning Characteristics of Building Materials.
- N. UL 900 - Test Performance of Air Filter Units.
- O. UL 1995 - Standard for Heating and Cooling Equipment.
- P. UL 94 - Test for Flammability of Plastic Materials for Parts in Devices and Appliances.
- Q. IBC 2000, 2003 - International Building Code.
- R. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
- S. NFPA 5000 - Building Construction and Safety Code.

- T. ASHRAE 90.1 Energy Code.
- U. AHRI Standard 1060 - Rating Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment.
- V. GSA 2003 Facilities Standard - 5.9 HVAC Systems and Components.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements. Computer generated fan curves for each air handling unit shall be submitted with specific design operating point noted. A computer generated psychometric chart shall be submitted for each cooling coil with design points and final operating point clearly noted. Sound data for discharge, radiated and return positions shall be submitted by octave band for each unit. Calculations for required baserail heights to satisfy condensate trapping requirements of cooling coil shall be included.
- B. Product Data:
 - 1. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, finishes of materials, electrical characteristics, and connection requirements.
 - 2. Provide data of filter media, filter performance data, filter assembly, and filter frames.
 - 3. Provide manufacturer's installation instructions.

1.5 SAFETY AGENCY LISTED & CERTIFICATION

- A. Air handler furnished with plenum fans shall be certified in accordance with the central station air handling units certification program, which is based on AHRI Standard 430.
- B. Air handling unit water heating & cooling coils shall be certified in accordance with the forced circulation air cooling and air heating coils certification program, which is based on AHRI Standard 410.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Accept products on site on factory-furnished shipping skids. Inspect for damage.
- C. Store in clean dry place and protect from construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

PART 2 - PRODUCTS

2.1 CENTRAL STATION AIR HANDLERS

- A. Unit Construction
 - 1. Configuration: Fabricate as detailed on drawings.
 - 2. Performance: Conform to AHRI 430. See schedules on prints.

3. Acoustics: Sound power levels (dB) for the unit shall not exceed the specified levels shown on the unit schedule. The manufacturer shall provide the necessary sound treatment to meet these levels if required.
4. Fabricate unit with heavy gauge channel posts and panels secured with mechanical fasteners. All panels, access doors, and ship sections shall be sealed with permanently applied bulb-type gasket. Shipped loose gasketing is not allowed.
5. Panels and access doors shall be constructed as a 2-inch nominal thick; thermal broke double wall assembly, injected with foam insulation or 2", 3 lb. fiberglass.
 - a. The inner liner shall be constructed of 20 galvanized steel.
 - b. The outer panel shall be constructed of 16 galvanized steel.
 - c. The floor plate shall be constructed as specified for the inner liner.
 - d. Unit will be furnished with solid inner liners at coil panels. Perforated at all others.
6. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, maximum 5 inches of positive or 6 inches of negative static pressure. Deflection shall be measured at the panel midpoint.
7. The casing leakage rate shall not exceed .5 cfm per square foot of cabinet area at 5 inches of positive static pressure or 6 inches of negative static pressure.
8. Module to module field assembly shall be accomplished with an overlapping, full perimeter internal splice joint that is sealed with bulb type gasketing on both mating modules to minimize on-site labor and meet indoor air quality standards.
9. Access doors shall be flush mounted to cabinetry, with minimum of two hinges, latch and full size handle assembly. Access doors shall swing outward for unit sections under negative pressure. Access doors on positive pressure sections, shall have a secondary latch to relieve pressure and prevent injury upon access.
10. A steel base rail shall be provided by the unit manufacturer for structural rigidity.

B. Fan Assemblies

1. Acceptable fan assembly shall be a single width, single inlet, backward included, direct-drive type plenum fan dynamically balanced as an assembly, as shown in schedule. Maximum fan RPM shall be below first critical fan speed. Fan assemblies shall be dynamically balanced by the manufacturer on all three planes. Provide access to motor and fan assembly through hinged access door. Selections shall not result in fan speeds greater than 70 Hz at design conditions.

C. Electrical

1. Fan motors shall be EC type. They shall meet or exceed EPAAct requirements. Complete electrical characteristics for each fan motor shall be as shown in schedule.
2. Unit shall be factory wired from single disconnect to individual fan motors.
 - a. Disconnect requirements:
 - 1) Motor circuit protectors or UL 489 circuit breakers. All disconnects shall include a lock-out mechanism when in the off position.
 - 2) The Motor Circuit protector shall be a UL listed 508 current limiting manual motor starter with magnetic trip elements only. The breaker shall carry a UL 508F rating (up to 100A frame size) which provides for coordinated short circuit rating for use with the motor contactor and provides a minimum interrupting rating of 30,000 AIC for the combination starter.
 - 3) Disconnect shall be UL 98 suitable for service entrance protection.
 - 4) UL 489 breaker shall include thermal and magnetic trip mechanisms.
 - b. Provide all conduit and conductors. Install per NEC.
3. Provide with smoke detector in return air stream path. Detector shall be factory wired to disable fans on smoke sensed at device. Provide device with AUX contacts that allow connection of addressable fire alarm relay. Relay by Division 26.
4. All electrical connection components shall be field provided and mounted as shown on project schedule.

D. Heating Water Coils

1. Certification: Acceptable water coils shall be certified in accordance with AHRI Standard 410 and bear the AHRI label. Coils exceeding the scope of the manufacturer's certification and/or the range of AHRI's standard rating conditions will be considered provided the manufacturer is a current member of the AHRI Forced Circulation Air-Cooling and Air-Heating Coils certification programs and that the coils have been rated in accordance with AHRI Standard 410. Manufacturer must be ISO 9002 certified.
2. Provide access to coil(s) for service and cleaning. Enclose coil headers and return bends fully within unit casing. Unit shall be provided with coil connections that extend a minimum of 5" beyond unit casing for ease of installation. Drain and vent connections shall be provided exterior to unit casing. Coil connections must be factory sealed with grommets on interior and exterior panel liners to minimize air leakage and condensation inside panel assembly. If not factory packaged, Contractor must supply all coil connection grommets and sleeves. Coils shall be removable through side and/or top panels of unit without the need to remove and disassemble the entire section from the unit.
 - a. Headers shall consist of seamless copper tubing to assure compatibility with primary surface. Headers to have intruded tube holes to provide maximum brazing surface for tube to header joint, strength, and inherent flexibility. Header diameter should vary with fluid flow requirements.
 - b. Fins shall have a minimum thickness of 0.0075 inch aluminum plate construction. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins.
 - c. Coil tubes shall be 5/8 inch OD seamless copper, 0.020 inch nominal tube wall thickness, expanded into fins, brazed at joints.
 - d. Coil connections shall be carbon steel, threaded connection. Vent and drain fittings shall be furnished on the connections, exterior to the air handler. Vent connections provided at the highest point to assure proper venting. Drain connections shall be provided at the lowest point to insure complete drainage and prevent freeze-up.

E. Filters

1. Furnish angled or flat filter section as shown on drawings with 2-inch MERV 8 filter.
2. See other specification section for media.
3. Filter Magnehelic gauge(s) shall be furnished and mounted by equipment manufacturer for each filter bank.

F. Plenum / Access Sections

1. Plenum section shall be provided and properly sized for inlet and/or discharge air flow (between 600 and 1500 feet per minute). The plenum shall provide single or multiple openings as shown on drawings and project schedule.
2. Access section shall be provided for access between hot water coil and cooling coil section, between future cooling section and fan inlet for servicing of fan and backdraft dampers of fan array., and where shown on drawings for servicing components. All access doors on the discharge side of supply air stream shall be inward opening against pressure.

G. Economizer Sections

1. Dampers shall be provided with opposed blade low leak airfoil damper blades. Dampers shall be hollow core galvanized steel airfoil blades, fully gasketed and have continuous vinyl seals between damper blades in a galvanized steel frame. Dampers shall have stainless steel jamb seals along end of dampers. Linkage and ABS plastic end caps shall be provided when return and outside air dampers sized for full airflow. Return and outside air dampers of different sizes or very large dampers and exhaust dampers must be driven separately. Damper Leakage: Leakage rate shall be less than two tenths of one percent leakage at 2 inches static pressure differential or 4 CFM/sq. ft at 1"wc whichever is more restrictive. Leakage rate tested in accordance with AMCA Standard 500. Openings shall be configured as shown on drawings.
- H. Manufacturer: Energy Labs, Haakon Ind., Govern Air, Hunt Air, Mammoth or approved.
- 2.2 In-Line Return Air Fans:
 1. The housing shall be constructed of welded steel. Housing shall have inlet and outlet collars for slip fit duct connections. The housing motor supports shall be constructed of structural steel members to prevent vibration. Welded steel vales shall straighten the flow of air from the fan discharge. Units shall be constructed with mounting arms shipped loose for field use where noted. Units shall accommodate base mount or ceiling hung mounting without structural modifications to the fan.
 2. The wheel shall be of the mixed flow type. Wheels shall have a wheel cone, spherical back plate and single thickness cambered blades. Wheels shall be statically and dynamically balanced to balance grade G6.3 per ANSIS2.19.
 - a. Motors: see section 230500 for inverter rated motor.
 - b. Fan shall be direct drive.
 3. Each assembled fan shall be test run at the factory at the specified fan RPM. The maximum allowable fan vibration shall be 0.15 in/sec. peak velocity, filter-in, for belt drive units in a single plane on the fan housing. This report shall be provided at no charge to the customer upon request.
 4. Provide with factory constructed and tested sound enclosure chamber. Inlet and outlet sound power levels shall be provided for each of the eight octave bands at the point of operation.
 5. Fans shall be licensed to bear the AMCA Seal for sound air performance. Greenheck QEID, or approved.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's Installation & Maintenance instructions.
- B. See Commissioning specification for additional requirements.
- C. Manufacturer's Field Service: Engage a factory authorized service representative to inspect field assembled components and equipment installation, to include electrical and piping connections. Report results to A/E in writing. Inspection must include a complete startup checklist to include (as a minimum) the following: Completed Start-Up Checklists as found in manufacturer's IOM.
- D. Engage a factory authorized service representative to perform startup service. Install clean filters. Measure and record electrical values for voltage and amperage. Refer to Division 23 "Testing, Adjusting and Balancing" and comply with provisions therein.
- E. Engage a factory authorized service representative to train owner's maintenance personnel to adjust, operate and maintain the entire unit. Refer to Division 01 Section Closeout Procedures and Demonstration and Training.

3.2 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

3.3 EXTRA MATERIALS

- A. Provide one extra set(s) filters for each unit as shown on project schedule.
- B. Filters: Specified filters or approved temporary construction filters shall be installed in supply units prior to start-up or used for drying and/or temporary heat. See specifications related to ensuring ducts remain clean during construction for more information.

3.4 PIPING

- A. Refer to applicable sections for piping, ductwork, insulation, painting, etc.

3.5 SMOKE DETECTOR INSTALLATION

- A. Install duct-mounted smoke detectors in return air duct in accordance with Code requirements and manufactures installation requirements.
- B. Where detectors are mounted in a concealed location, provide remote indicating panel located as directed.
- C. Automatic Smoke Detector Fan Shutdown: Wire detectors to shut down fans on detection of smoke by detector. Coordinate with Owners Control Contractor for fan shut down by BAS.

3.6 CONTROLS

- A. Wiring: All wiring shall be in accordance with the National Electrical Code and local electrical codes.
- B. Coordinate with Owners control contractor for operation.

END OF SECTION 23 74 00