SECTION 237313 - MODULAR INDOOR AIR HANDLING UNITS

Part 1 - GENERAL

1.1. SECTION INCLUDES

A. Indoor Air Handling Units.

1.2. 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 base rail 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.

4. If submitted material is different from that of the design basis, Air Handler size, capacities, physical connections, electrical requirements, weight or concrete pad requirements, manufacture shall incur all costs associated with these required changes and coordination with other trades.

1.3. SAFETY AGENCY LISTED & CERTIFICATION

A. Air Handling units shall be cETLus safety listed to conform with UL Standard 1995 and CAN/CSA Standard C22.2 No. 236. Air handler furnished with double width, double inlet (DWDI) fans and/or plenum fans where applicable, shall be certified in accordance with the central station air handling unit certification program, which is based on AHRI Standard 430. (NOTE: Above does not apply to fan array)

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.

1.4. 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.

1.5. WARRANTY

A. Contractor shall warranty entire systems and equipment for a period of one (1) year.

Part 2 - PRODUCTS

2.1. MANUFACTURERS

A. Daikin

B. Johnson Controls, INC.

C. Trane

D. Dunham Bush

2.2. GENERAL DESCRIPTION

A. Configuration: Fabricate as detailed on drawings.

B. Performance: Conform to AHRI 430. See schedules on prints. (NOTE: above does not apply to fan array)

C. 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.

2.3. UNIT CONSTRUCTION

A. 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.

B. Panels and access doors shall be constructed as a 2-inch nominal thick; thermal broke double wall assembly, injected with foam insulation with an R-value of not less than R-13.

1. The inner liner shall be constructed of G90 galvanized steel.

2. The outer panel shall be constructed of G90 galvanized steel.

3. The floor plate shall be constructed as specified for the inner liner.

4. Unit will be furnished with solid inner liners.

C. 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.

D. The casing leakage rate shall not exceed 0.50 cfm per square foot of casing surface area at design static pressure up to a maximum of +5” w.c. in positive pressure sections and -6” w.c. in negative pressure sections (.0025 m3/s per square meter of cabinet area at 1.24 kPa static pressure)

E. The casing leakage rate shall not exceed 1% of supply air volume at design static pressure up to a maximum of +8” w.c. in positive pressure sections and -8” w.c. (1.99 kPa) in negative pressure sections.

F. 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.

G. Access doors shall be flush mounted to cabinetry, with minimum of two, six inch long stainless steel piano-type 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.

H. A 6-inch formed G60 galvanized steel base rail shall be provided by the unit manufacturer for structural rigidity and condensate trapping. The base rail shall be constructed with 12-gauge nominal for unit sizes 003 - 035 and 10-gauge nominal for unit sizes 040 - 090. An 8-inch formed G60 galvanized steel base rail shall be provided by the unit manufacturer for structural rigidity and condensate trapping.

I. Construct drain pans from stainless steel with cross break and double sloping pitch to drain connection. Provide drain pans under cooling coil section. Drain connection centerline shall be a minimum of 3’’ above the base rail to aid in proper condensate trapping. Drain connections that protrude from the base rail are not acceptable. There must be a full 2’’ thickness of insulation under drain pan.

J. Factory leakage test available for units selected with high pressure, low leakage construction. The unit manufacturer shall provide a witnessed factory leak test on selected units. The cabinet shall be tested at the unit’s positive and negative maximum design operating static pressure, up to 8" of differential static pressure across the cabinet exterior walls for the entire unit. Cabinet leakage shall not exceed Class 6 leakage per ASHRAE Standard 111. All supply and return opening shall be sealed. Air pressure and flow shall be measured by a third party calibrated and certified apparatus. The testing shall be performed at the factory. Owner’s representative shall select on unit to be tested at the time of order. A written test report shall be prepared by the manufacturer and issued to the owner's representative.

K. Factory panel deflection testing available for units selected with high pressure, low leakage construction. The unit manufacturer shall provide a factory deflection test on one unit at the unit’s positive and negative maximum design operating static pressure, up to 8" of differential static pressure across the cabinet exterior walls for the entire unit. A deflection limit of L/240 will be demonstrated at this time. “L” is defined as the height of a panel on the side of the unit. Measurement shall be at the mid-point of “L” along the largest panel on one side. Owner’s representative shall select on unit to be tested at the time of order. A written test report shall be prepared by the manufacturer and issued to the owner’s representative.

2.4. FAN ASSEMBLIES

A. Acceptable fan assembly shall be a single width, single inlet, class II, 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. Provide number of fans for air handler as shown on drawings.

1. Unit shall have two 9 blade direct drive class II fans.

2. Manual block-off mounted upstream of fan for isolation of individual fans.

3. Single source power motor control panel with short circuit protection factory wired from panel to motors in conduit shall be provided.

4. Fan shall include peizo ring per fan for air flow monitoring. Transducer shall be included.

B. Fan and motor shall be mounted internally on a steel base. Factory mount motor on slide base that can be slid out the side of the unit if removal is required. Provide access to motor, drive, and bearings through hinged access door. Fan and motor assembly shall be mounted on 2" deflection spring vibration type isolators inside cabinetry.

2.5. BEARINGS, SHAFTS, AND DRIVES

A. Bearings: Basic load rating computed in accordance with AFBMA - ANSI Standards. The bearings shall be provided on the motor with the fan wheel mounted directly on the motor shaft, AMCA arrangement 4.

B. Shafts shall be solid, hot rolled steel, ground and polished, keyed to shaft, and protectively coated with lubricating oil. Hollow shafts are not acceptable.

C. The fan wheel shall be direct coupled to the motor shaft. The wheel width shall be determined by motor speed and fan performance characteristics.

2.6. ELECTRICAL

A. Fan motors shall be manufacturer provided and installed, VFD rated, Open Drip Proof, premium efficiency (meets or exceeds EPAct requirements), single speed, 460V / 60HZ / 3P. Complete electrical characteristics for each fan motor shall be as shown in schedule.

B. The air handler(s) shall be ETL and ETL-Canada listed by Intertek Testing Services, Inc. Units shall conform to bi-national standard ANSI/UL Standard 1995/CSA Standard C22.2 No. 236.

C. Wiring Termination: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclosed terminal lugs in terminal box sized to NFPA 70.

D. Air handler manufacturer shall provide, variable speed drive with electrical characteristics for field installation by EC such as indicated on project schedule and shown on manufacturer's data sheets.

2.7. COOLING AND HEATING COILS

A. Certification: Acceptable water cooling, water heating, steam, and refrigerant 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.

B. Water cooling coil shall be provided. 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.

1. 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.

2. 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.

3. Coil tubes shall be 5/8 inch OD seamless copper, 0.020 inch nominal tube wall thickness, expanded into fins, brazed at joints.

4. Coil connections shall be carbon steel, NPT threaded connection. Connection size to be determined by manufacturer based upon the most efficient coil circuiting. 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.

5. Coil casing shall be a formed channel frame of galvanized steel.

C. Water heating coil shall be provided. 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.

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5. Coil shall be furnished as an uncased galvanized steel track to allow for thermal movement and slide into a pitched track for fluid drainage.

2.8. FILTERS

A. Furnish flat panel filter section with 2-inch or 4" pleated MERV 8 filter. Provide side loading and removal of filters.

B. Furnish combination filter section with 2-inch or 4" pleated MERV 8 flat pre-filter and 12-inch Varicel SH cartridge, 95% efficient (MERV 13) final filter. Provide side loading and removal of filters.

C. Filter media shall be UL 900 listed, Class I or Class II.

D. Filter Magnehelic gauge(s) shall be furnished and mounted by equipment manufacturer and wired back to the Building Management System.

2.9. ADDITIONAL SECTIONS

A. 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.

B. Access section shall be provided for access between components.

C. Mixing box section shall be provided with end outside air opening and no return air opening with or without parallel 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. Connecting linkage and ABS plastic end caps shall be provided when return and outside air dampers are each sized for full airflow. Return and outside air dampers of different sizes must be driven separately. Damper Leakage: Leakage rate shall be less than two tenths of one percent leakage at 2 inches static pressure differential. Leakage rate tested in accordance with AMCA Standard 500.

D. Economizer section shall be provided with end outside air opening and top return air opening and top exhaust air opening without (opening only) or with parallel low leak airfoil damper blades. If furnished with dampers, they 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. Leakage rate tested in accordance with AMCA Standard 500.

E. Energy recovery wheel requirements shall be based on air-to-air energy recovery specification 237200.

F. Unit shall include outside air flow monitoring.

G. Provide filter racks and minimum MERV rating of 7 on both entering air slides to the heat wheel

H. Each heat wheel shall include a frost control method. The control for the unit shall be provided though the building DDC control system.

I. Lighting and Convenience outlet circuit

J. Vapor-proof service light and convince outlet shall be provided in each fan section and mixing box section.

Part 3 - EXECUTION

3.1. INSTALLATION

A. Install in accordance with manufacturer’s Installation & Maintenance instructions.

B. Startup and training to be provided by a factory-trained service technician for a total of four (4) hours. These hours of training are to be "bankable hours" used within one full warranty year.

C. All training and start-up shall be videotaped with a professional videographer and present two (2) copies of the training on DVD format to the Construction Manager within one (1) week of the training session. This DVD will be provided to the owner.

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 ran under observation.

3.3. EXTRA MATERIALS

A. Provide one complete set of filters and belts for each air handling unit, for owners use at completion of project.

END OF SECTION 237313

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