

SECTION 15855: AIR HANDLING UNITS WITH COILS

PART 1 - GENERAL

1.1 WORK INCLUDED:

Packaged Air Handling Units.

1.2 QUALITY ASSURANCE:

1.2.1 Air Handling Units: Product of manufacturer regularly engaged in production of components who issues complete catalog data on total product offering.

1.2.2 Constant Volume Air Handling Units: Certify air volume, static pressure, fan speed, brake horsepower and selection procedures in accordance with ARI 430. All air handling units must be certified through ARI Standard 430. Any costs incurred to adjust fans to meet scheduled capacities shall be the sole responsibility of the contractor.

1.2.3 Air Coils: Certify capacities, pressure drops and selection procedures in accordance with ARI 410-87.

1.3 SUBMITTALS:

1.3.1 Submit as-built drawings and product data under the General Conditions of these contract documents and as specified herein. As-built drawings shall show total unit configuration in direction of airflow, unit dimensions, and field duct connection details.

1.3.2 Product data shall indicate dimensions, weights, coil performance, fan performance, motor electrical characteristics, finishes of materials, filter media, filter sizes, and filter quantities.

1.3.3 Submit manufacturer's installation instructions under the General Conditions of these contract documents and as specified herein.

1.3.4 Provide fan curves with specified operating point clearly plotted. Fan curves shall indicate air volume, static pressure, fan speed and brake horsepower.

1.3.5 Submit sound power levels by octave band for air handling units at scheduled design conditions. Provide sound power levels for "discharge" and "inlet plus cabinet" sound paths in accordance with AMCA 300 and AMCA 301. If unit sound power levels exceed values of the scheduled units on drawings, contractor shall submit detailed plan outlining steps to meet design noise levels.

1.3.6 The contractor shall provide a 1/2" scale drawing of the mechanical equipment rooms where all air handling units will be located. The drawing shall show all piping, equipment and recommended clearances for the equipment. This drawing shall be furnished prior to commencement of work.

1.4 DELIVERY, STORAGE, AND HANDLING:

1.4.1 Deliver products to site under the General Conditions of these contract documents and as specified herein. Units shall ship fully assembled up to practical shipping and rigging limitations. Units not shipped fully assembled shall have tags and airflow arrows on each section to indicate location

and orientation in direction of airflow. Each section shall have lifting lugs or shipping skid to allow for field rigging and final placement of section.

1.4.2 Deliver units to site with fan motors, sheaves, and belts completely assembled and mounted in units. Mount motors as specified herein.

1.4.3 Store and protect products under the General Conditions of these contract documents and as specified herein.

1.4.4 Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.5 ENVIRONMENTAL REQUIREMENTS:

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.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

2.1.1 Trane Company; Model: Modular Climate Changer. Model BCHB is not acceptable.

2.1.2 Carrier; Model: 39T. Model 39L and 39NX are not acceptable.

2.1.3 Substitutions: Any manufacturer desiring to furnish equipment for this project, who is not listed above shall provide complete submittal data as outlined above, fourteen (14) days prior to the bid date. Sales literature and general catalog data will not be acceptable. If a manufacturer is deemed acceptable to bid, the name/model number of that manufacturer will be listed by addendum. If the manufacturer is not listed herein or by addendum they will not be acceptable. Additionally, listing herein or by addendum does not alleviate the contractor from furnishing equipment which meets the letter and the intent of this specification.

2.2 GENERAL:

2.2.1 Manufacturer must clearly define any exceptions made to Plans and Specifications. Mechanical Contractor is responsible for expenses that occur due to exceptions made.

2.2.2 Fabricate draw-thru type air handling units with fan sections, coil sections, access sections, mixing boxes, filter sections as shown on the plans.

2.2.3 Factory fabricate air handling units of sizes, capacities, and configurations as scheduled on drawings.

2.2.4 Provide factory installed base rails/mounting legs to support all sections of units, if a concrete housekeeping pad is not shown. Construct base rails/mounting legs of minimum ten (10) gauge galvanized steel channels or I-beams. Base rails/mounting legs shall have enough height to ensure proper trapping of condensate of all air handling units. Contractor will be responsible for providing a housekeeping pad when base rails/mounting legs are not of sufficient height to properly trap unit. Base rail/mounting legs not constructed of galvanized steel shall be chemically cleaned, coated with

rust inhibiting primer, and finished with rust inhibiting enamel.

2.2.5 The general contractor shall provide a concrete housekeeping pad for all units located on the floor. The concrete house keeping pad shall be tall enough to provide proper trapping of the air handling unit. The concrete pad height shall have a minimum height as determined by the following formula. Total Concrete Pad Height and Trap Height = $[1.5 \times (\text{Total Static Pressure (in inches)} + 1) + [1.5 \times \text{Condensate Drain Diameter (in inches)}]] + \text{insulation thickness}$.

2.3 CASING:

2.3.1 Construct casings of minimum sixteen (16) gauge galvanized steel structural frames and minimum two (2) inch thick double wall panels. Construct double wall panels of minimum eighteen (18) gauge galvanized steel exterior panels and minimum twenty (20) gauge perforated galvanized steel interior panels in the fan section and solid twenty (20) gauge galvanized steel in all other sections. In order to properly clean the interior of the air handler of microbial growth and other debris, the casings shall be constructed such that structural frames are free standing and double wall panels are non-load bearing.

2.3.2 Construct casing sections located upstream of supply fan for operation at four (4) inches water gage negative static pressure and casing sections located downstream of supply fan for operation at six (6) inches water gage positive static pressure. Seal joints between casing sections with closed-cell foam gasketing for leak seal and thermal and acoustical break.

2.3.3 Panels shall be fully removable to allow for a proper way to thoroughly clean panels of microbial growth and to access internal parts. Secure panels to structural frames with zinc chromated plated screws. Seal joints between exterior panels and structural frames with closed-cell foam gasketing for leak seal and thermal and acoustical break.

2.3.4 Casings not constructed of G90-U galvanized steel, casings with welds on exterior surfaces, or casings with welds on interior surfaces that have burned through to exterior surfaces shall be chemically cleaned, coated with rust inhibiting primer, and finished with rust inhibiting enamel in order to prevent premature corrosion and microbial growth.

2.3.5 Casing shall have removable access panels or doors as scheduled on drawings. Construct access doors of minimum eighteen (18) gauge galvanized steel exterior panels and minimum twenty-two (22) gauge galvanized steel interior panels. Provide automotive style neoprene gasketing around full perimeter of access doors to prevent air leakage. Provide "ventlock" style non-corrosive alloy latches operable from the inside or outside of unit. If access doors do not open against unit operating pressure, provide safety latches that allow access doors to partially open after first handle movement and fully open after second handle movement. Insulate access doors with two (2) inch thick 1-1/2 pound per cubic foot density matt faced fiber glass insulation. The above mentioned type access doors shall be provided in the following sections, at a minimum: Fan section and mixing box section.

2.3.6 Insulate ALL casing sections, including filter/mixing box section with two (2) inch thick, 1-1/2 pound per cubic foot density matt faced fiber glass insulation. Provide double wall casing construction and encase insulation between exterior and interior casing panels such that no insulation is exposed to airstream. Foil facing on insulation is not acceptable as alternate to double wall construction. Insulate all structural channels connected to casing panels and cover openings in structural channels with galvanized steel. Insulation shall comply with NFPA 90A.

2.3.7 Provide sealed double wall drain pans constructed of minimum 18 gauge galvanized steel exterior pans and minimum 18 gauge galvanized steel interior pans. Encase manufacturer's standard insulation between exterior and interior walls. Drain pans shall be sloped in two (2) planes; cross break interior pans and pitch toward drain connections to ensure complete condensate drainage. Units with coils shall have drain pans under complete coil section and horizontal draw-thru units shall have drain pans under complete fan section, coil sections and all access sections between coils. All drain pan connections will be to the side of the unit to enable proper trapping. The contractor shall properly pipe the all drain connections per the local codes.

2.4 FANS:

2.4.1 Provide supply fan sections with forward curved (FC), backward inclined (BI) or airfoil (AF) double width, double inlet centrifugal fan designed and suitable for class of service indicated on the unit schedule. The fan type shall be scheduled on the prints. Fan shaft to be properly sized and protectively coated with lubricating oil. Fan shafts shall be solid and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. Fans shall be statically and dynamically tested as an assembly at the required RPM to meet design specifications. Key fan wheels to fan shaft to prevent slipping.

2.4.2 Provide self-aligning, grease lubricated pillow-block ball bearings selected for L-50, 200,000 hour average life per ANSI/AFBMA 9. Extend grease lubrication fittings to drive side of unit with plastic tubes and zerk fittings rigidly attached to casing.

2.4.3 Mount fans on minimum 16 gauge steel isolation bases. Internally mount motors on same isolation bases and internally isolate fans with one (1) inch or two (2) inch housed spring isolators. Install flexible canvas ducts between fan and casings to ensure proper isolation and prevent vibration and noise from being transmitted through the unit and ductwork. Flexible canvas ducts shall comply with NFPA 90A.

2.4.4 Fan sections shall have full height, double wall, hinged, removable access doors on drive side for inspection and maintenance of internal components. Construct doors as described above.

2.4.5 Statically and dynamically balance fan section assemblies. Fan section assemblies include fan wheels, shafts, bearings, drives, belts, isolation bases and isolators. Allow isolators to free float when performing fan balance. Measure vibration at each fan shaft bearing in horizontal, vertical and axial directions. Balance at design RPM's as scheduled on drawings.

2.5 MOTORS AND DRIVES:

2.5.1 Factory install all motors on slide base to permit adjustment of belt tension.

2.5.2 Fan Motors shall be heavy duty, high efficiency open drip-proof, operable at the scheduled voltage and phase. The minimum motor efficiency shall be 92%.

2.5.3 V-Belt Drive shall be variable pitch rated at 1.2 times the motor nameplate.

2.6 COILS:

2.6.1 Install coils such that headers and return bends are enclosed by unit casings. All coils shall be ARI 410 certified.

2.6.2 Construct coils of configuration plate fins and seamless tubes. Fins shall have collars drawn, belled and firmly bonded to tubes by means of mechanical expansion of tubes. Do not use soldering or tinning in bonding process.

2.6.3 Construct coil casings of minimum 16 gauge galvanized steel with formed end supports and top and bottom channels. If two or more coils are stacked in unit, install intermediate drain channels between coils to drain condensate to main drain pans without flooding lower coils or passing condensate through airstream. Staggered or offset coils designed to fit additional coil area in smaller casings are not acceptable. All coils shall be vertically stacked on top of one another.

2.6.4 Water Coils

2.6.4.1 Clearly label supply and return headers on outside of units such that direction of coil water-flow is counter to direction of unit air-flow.

2.6.4.2 Coils shall be proof tested to 300 psig and leak tested to 200 psig air pressure under water.

2.6.4.3 Construct headers of round copper pipe or cast iron.

2.6.4.4 Construct tubes of 1/2 inch O.D. copper and construct fins of aluminum.

2.7 FILTERS:

2.7.1 Provide factory fabricated filter section of the same construction and finish as unit casings. All filter sections shall be furnished complete with insulated double wall construction. Filter sections shall have filter guides and full height, double wall, hinged, removable access doors for filter removal. Construct doors in accordance with these contract documents. Filter sections shall flange to other unit components. Provide filter blockoffs as required to prevent air bypass around filters. The manufacturer shall provide two (2) complete sets of filters, in addition to start-up filters. The contractor shall provide additional filters required to maintain cleanliness of the equipment. The contractor shall be responsible for cleaning the units internally prior to completion of the project.

2.7.2 For the prefilter and the mixing box, provide two (2) inch angled filter sections with maximum face velocity of 500 feet per minute with disposable pleated media filters. Filters shall be removable from one side of filter sections.

2.8 DAMPERS AND FLOW MEASURING STATION FOR USE IN MIXING BOX:

2.8.1 Provide internally mounted return air dampers as scheduled on drawings. Return air dampers shall be equal to Ruskin CD60 double skin airfoil design or equivalent. Provide internally mounted outside air dampers with blade seals. Construct damper blades of minimum 14 gauge galvanized steel and damper frames of minimum 16 gauge galvanized steel. Provide parallel blade action configured to mix return and outside air with metal compressible jamb seals and extruded vinyl blade edge seals. Blades shall rotate on stainless steel sleeve bearings. Damper blade lengths shall not exceed 60 inches. Leakage rate shall not exceed 8 CFM/square foot at one inch water gage and 12 CFM/square foot at 4 inches water gage.

2.8.2 Provide air flow measuring station for the outside air connections of each air handling unit. The air flow measuring station shall be installed in the air handling unit mixing box, in strict

accordance with the manufacturer's published requirements. The air flow measuring systems shall operate with a 24 VAC power supply and be capable of functioning accurately between -20°F and +160°F. The air flow measuring system shall transmit a 2-10 VDC linear signal representative of velocity and be factory calibrated with total accuracy of +/- 5% of actual flow down to 15% of the nominal flow. Calibration of the airflow measurement system shall be the responsibility of the Building Automation System contractor. The Building Automation System contractor shall be responsible for furnishing and installing the damper actuators for the air flow measurement and modulation device.

2.8.3 Externally mounted outside airflow measuring stations are acceptable for indoor units. The HVAC contractor shall be responsible for providing the measuring station and all connections, equipment and access panels necessary to provide an installation equal to that specified for measuring stations mounted internal to the air handling unit.

2.9 ACCESS SECTIONS:

2.9.1 Provide access sections as shown or scheduled on drawings. Access sections shall have double wall, hinged, removable access doors on one side of section. Construct doors these contract documents and as outlined above.

2.9.2 Construct access sections such that access may be obtained to internal components through any access panel. Construct panels of minimum 18 gauge galvanized steel. In order to properly clean the interior of the air handler of microbial growth and other debris, the casings shall be constructed such that structural frames are free standing and double wall panels are non-loading bearing. Contractor shall be responsible to provide connection flanges and all other framework that is needed on unit to ensure that removal of double wall panels shall not affect structural integrity of unit.

PART 3 - EXECUTION

3.1 INSTALLATION:

3.1.1 The contractor shall properly orient and position the equipment on the housekeeping pad and install per the manufacturer's recommendation.

3.1.2 The equipment shall be installed per the manufacturer's recommendations and these contract documents.

3.1.3 Make connections to coils per the coil details outlined in these contract documents.

END OF SECTION