

PART 1 GENERAL

1.01 WORK INCLUDED: Modular Central Air Handling Units.

1.02 RELATED WORK

- A. Division 15B
- B. Division 16

1.03 REFERENCES

- A. ARI 430 - Standard for Central Station Air Handling Units.
- B. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- C. ANSI/AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- D. SMACNA - HVAC Duct Construction Standards.
- E. ARI 410 - Standard for Forced Circulation Air-Cooling and Air-Heating Coils.
- F. ANSI/UL 900 - Test Performance of Air Filter Units.
- G. AMCA 300 - Reverberant Method for Sound Testing of Fans.
- H. AMCA 301 - Method for Publishing Sound Ratings for Air Moving Devices.
- I. ASHRAE 68 - Laboratory Method of Testing In-Duct Sound Power Measurement Procedure for Fans.

1.04 QUALITY ASSURANCE

- A. Air Handling Units: Product of manufacturer regularly engaged in production of components who issues complete catalog data on total product offering.
- B. Constant Volume Air Handling Units: Certify air volume, static pressure, fan speed, brake horsepower and selection procedures in accordance with ARI 430. If air handling units are not certified in accordance with ARI 430, contractor shall be responsible for expenses associated with testing of units after installation to verify performance of fan(s). Any costs incurred to adjust fans to meet scheduled capacities shall be the sole responsibility of the contractor.
- C. Variable Air Volume Air Handling Units with Variable Inlet Vanes: Certify air volume, static pressure, fan speed, brake horsepower and selection procedures in accordance with ARI 430. Certify units with inlet vanes in wide-open position. If air handling units are not certified in accordance with ARI 430, contractor shall be responsible for expenses associated with testing of units after installation to verify performance of fan(s). Any costs incurred to adjust fans to meet scheduled capacities shall be the sole responsibility of the contractor.
- D. Air Coils: Certify capacities, pressure drops and selection procedures in accordance with ARI 410-87.

1.05 SUBMITTALS

- A. Submit unit performance including: capacity, nominal and operating performance.
- B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.
- D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site per manufacturer. 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.
- B. Deliver units to site with fan motors, sheaves, and belts completely assembled and mounted in units. Mount motors as specified in Article 2.04 Paragraph F and Article 2.05 Paragraph A.
- C. Store and protect products per manufacturer.
- D. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.07 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.

1.08 EXTRA STOCK: Provide 1 year's supply, at least (6) sets of pleated media filters. See section 15870.

1.09 WARRANTY

- A. Provide unit with 5-year parts warranty and 2-year factory labor warranty.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Trane Company; Model: Modular Climate Changer
- B. YORK; Model: Airpak
- C. Carrier; Model: UniFlex 39NX
- D. Substitutions: Under provisions of General Conditions

2.02 GENERAL

- A. Manufacturer must clearly define any exceptions made to Plans and Specifications. Mechanical Contractor is responsible for expenses that occur due to exceptions made.
- B. Fabricate draw-thru type air handling units with fan sections.
- C. Factory shall fabricate air handling units of sizes, capacities, and configurations as scheduled on drawings.
- D. Provide factory installed unit mounting legs to support all sections of units. If unit mounting legs are not provided, manufacturer shall provide a base rail for shipping and mounting purposes. Contractor will be responsible for providing a housekeeping pad when unit mounting device is not of sufficient height to properly trap unit. Unit mounting devices not constructed of galvanized steel shall be chemically cleaned, coated with rust inhibiting primer, and finished with rust inhibiting enamel.

2.03 CASING

- A. Unit shall be constructed of a complete structural frame with removable panels. Removal of side panels shall not affect the structural integrity of the unit. Contractor shall be responsible to provide connection flanges and all other framework that is needed on unit to ensure that removal of unit's panels shall not affect structural integrity.

B. Panels shall be fully removable to allow for a proper way to thoroughly clean panels of microbial growth and to access internal parts. If panels are not removable, then manufacturer shall provide access sections with doors between all internal components to ensure access and cleanability of the air handler.

C. Construct casing sections located upstream of supply fan for operation at 4 inches water gage negative static pressure and casing sections located downstream of supply fan for operation at 6 inches water gage positive static pressure.

D. All exterior panels and structural frames shall be constructed of G90-u galvanized steel. 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. Seal joints between exterior panels and structural frames with closed-cell foam gasketing for air seal and thermal and acoustical break.

E. Casing shall have removable full size access panels or doors as scheduled on drawings. Access doors shall have double wall construction. 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 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.

F. Insulate all sections handling conditioned air with 1" thick 1-1/2 lb. per cubic ft. density matt faced fiberglass or equivalent. Install insulation with adhesive. If edges of fiberglass insulation are exposed, the contractor shall be responsible for sealing exposed edges with mastic sealer to prevent erosion into the airstream. Insulation, adhesive, and mastic sealer (if required) shall conform to NFPA 90A.

2.04 DRAIN PAN CONSTRUCTION

Provide sealed double wall drain pans constructed of G90-U galvanized steel exterior panels and G90-U galvanized steel interior liner. Encase insulation between exterior and interior walls. Drain pans shall be sloped in 2 planes; cross break interior pans and pitch toward drain connections to ensure complete condensate drainage. Units with cooling coils shall have drain pans under complete cooling coil section. All drain pan connections will be to the side of the unit to enable proper trapping. Units without 2-way sloped drain pans shall coat drain pans with anti-microbial treatment.

2.05 FANS

A. Provide supply fan section(s) with FC double width, double inlet centrifugal fan designed and suitable for class of service indicated in the unit schedule. 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.

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

B. Mount fans on isolation bases. Internally mount motors on same isolation bases and internally isolate fans and motors with 1 inch spring isolators. Install flexible canvas ducts between fan and casings to ensure complete isolation. Flexible canvas ducts shall comply with NFPA 90A. If no isolators or flexible canvas duct is provided, then the entire unit shall be externally isolated from the supply duct work and piping by contractor in order to avoid transmission of noise and vibration through the ductwork.

C. Fan sections shall have full height, double wall, hinged, removable access doors on drive side for inspection and maintenance of internal components. Construct doors in accordance with Article 2.03 Paragraph E.

D. Weigh fan and motor assembly at AHU manufacturer's factory for isolator selection. Manufacturer shall 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. Manufacturer shall measure vibration at each fan shaft bearing in horizontal, vertical and axial directions. Balance at design RPM's as scheduled on drawings.

2.06 MOTORS AND DRIVES

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

B. Fan Motors shall be heavy duty, open drip-proof, operable at 460 Volts, 60 Hz, 3-phase.

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

2.07 COILS

A. Coils shall be manufactured by the same company as the supplier of the air handling unit. Install coils such that headers and return bends are enclosed by unit casings.

B. The wet section of the unit as defined as the entering air side of the dehumidification coil to the leaving edge of the drain pan, shall be insulated. The insulated surface shall meet UL 181 requirements. The airstream surface of the insulation shall be constructed or coated such that it is not biodegradable, repels water and it can be cleaned to prevent microbiable growth. The manufacturer's maintenance instructions shall describe the proper cleaning procedures for the unit.

C. 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.

D. Construct coil casings of 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.

E. Water Cooling Coils

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- flo.

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

3. Construct headers of round copper pipe or cast iron.

4. Construct tubes of 1/2 inch O.D. minimum .016 inch thick copper and construct fins of aluminum.

F. Steam Heating Coils

1. Clearly label supply and return connections on outside of units.

2. Provide non-freeze steam distributing type coils. Pitch steam coils in units for proper drainage of steam condensate from coils.

3. Proof test coils to 300 psig air under water and leak test coils to 200 psig air pressure under water.

4. Construct headers of cast iron or round copper pipe.

5. Inner tubes shall have orifices that ensure even steam distribution across coil face. Direct orifices toward return connections to ensure steam condensate is discharged from coils.

G. Refrigerant Cooling Coils

1. Clearly label suction and liquid connections on outside of units.
2. Proof test coils to 450 psig air under water and leak test coils to 300 psig air pressure under water. Dry insides of coils after testing and seal all connections.
3. Construct suction headers of copper tubing. Suction connections shall penetrate unit casings to allow for sweat connections to refrigerant lines.
4. Coils shall have equalizing type vertical distributors sized in conjunction with capacities of coils.

2.08 FILTERS

A. Provide factory fabricated filter section of the same construction and finish as unit casings. Filter sections shall have filter guides and full height, double wall, hinged, removable access doors for filter removal. Construct doors in accordance with Article 2.03 Paragraph E. Filter sections shall flange to other unit components. Provide filter block-offs as required to prevent air bypass around filters.

B. Provide 2 inch angled filter sections with pleated filters. Filters shall be removable from one side(s) of filter sections.

C. Coated filters shall be coated with an anti-microbial agent to prevent microbes from growing in the filters. The agent is comprised of a silane quaternary ammonium which exhibits permanent chemical bonding capability. The treatment will provide a minimum level of 90% bacterial reduction as compared with an untreated control when tested according to AATCC Test Method 100-1988 or equivalent anti-microbial test and a maximum of 20% fungal growth on the substrate as compared with an untreated control when tested according to AATCC Test Method 30. Anti-microbial materials must be registered with the Environmental Protection Agency under FIFRA and FEPCA and must be used in strict accordance with the registration.

2.09 DAMPERS

Provide dampers to modulate the volume of return air. Damper blades shall be galvanized steel, housed in a galvanized steel frame and mechanically fastened to an axle rod rotating on bearings. Blade seals are required to assure tight closure. All dampers shall be rated for a maximum leakage rate of less than 1 percent of nominal CFM at one-inch w.g.

2.10 FLOAT SWITCH

Provide a float switch in an auxiliary drain pan under each unit. Float switch shall secure tightly to drain pan with set screws. Clips are not acceptable. Provide Diversitech Model CC-1 or equal.

2.11 AIR HANDLING UNIT SCHEDULE: see drawings

PART 3 EXECUTIONS

Install AHU in strict accordance with manufacturer's instructions and SMACNA and NFPA requirements.

END OF SECTION