

SECTION 23 74 20

PACKAGED ROOFTOP VAV UNITS

PART 1 GENERAL

- 1.01 Unit shall be self-contained roof mounted type consisting of filters, evaporators, fans and motors, outside air intake, cooling coil, condensate collector and drain, compressors, condenser fans and motors, inter-connecting refrigerant piping and factory installed DDC controls. The units shall be designed in accordance with UL requirements, be A.R.I. rated and meet all applicable requirements of ASHRAE 90.1.
- A. Units shall be Trane Model Intellipak or equal model provided by JCI/York or Daikin for all packaged units scheduled as Intellipak. Contractor shall furnish and install packaged rooftop air conditioning unit(s) as scheduled on the contract documents. The unit(s) shall be provided as described within this specification and perform at the conditions scheduled. Cooling and Heating capacity ratings shall be based upon AHRI Standard 360.

PART 2 PRODUCTS

2.01 CASING

- A. Casing: Exterior panels shall be zinc coated galvanized steel, phosphatized and painted with a slate grey air-dry durable finish. Refrigeration components and compressor shall be accessible through removable louvered panels as standard. Unit air handling section shall be laminated double wall construction with foam injected or fiberglass insulation, between sheet metal panels and liners. All interior surfaces shall be suitable for cleaning per ASHRAE 62. All access doors and panels shall have neoprene gaskets. Unit base shall be watertight with heavy gauge formed load bearing members and curb overhang. Unit lifting lugs shall accept chains or cables for rigging. Lifting lugs shall also serve as unit tie down points.
- B. Access doors shall be hinged with a single, exterior mounted, height and tension adjustable, handle to provide positive latching at three points. Access doors shall provide a door stop mechanism to latch the door in the open position to prevent unsafe door closure by wind. Doors of laminated double wall construction with foam injected or fiberglass insulation, between the exterior sheet metal pane and the interior liner shall be provided on the air handler's serviceable compartments such as exhaust fans, supply fans, filters, evaporator coil, gas heat, and blank sections. Two single wall doors shall be provided for access to the control panel.

2.02 EVAPORATOR COILS

- A. Provide heavy duty aluminum fins mechanically bonded to copper tubes

of sufficient size to provide the cooling requirements as scheduled on the drawings. Evaporator coil shall be inter-circuited to maintain active coil face area at part load conditions. Coil shall also utilize internally enhanced tubing for maximum efficiency. Provide a thermostatic expansion valve (TXV) for each refrigerant circuit. Provide double sloped stainless steel drain pan to assure positive drainage of condensate from the unit casing.

2.04 CONDENSER COILS

- A. Condenser coils shall have all Aluminum Microchannel coils. All coils shall be leak tested at the factory to ensure pressure integrity. The condenser coil is pressure tested to 650 psig. Provide subcooling circuit(s) integral with condenser coils to maximize efficiency and prevent premature flashing of liquid refrigerant, to a gaseous state, ahead of the expansion valve. Provide vertical discharge, direct drive, fans with steel blades, and three phase totally enclosed, air over cooled, motors. Fans shall be statically and dynamically balanced. Motors shall be permanently lubricated, with built-in current and thermal overload protection. There shall be no dissimilar metals within the condenser coil. As an alternative, copper tubes and copper fins shall be provided with corrosion protection as described below.
- B. Provide factory-installed louvered steel coil guards around perimeter of condensing section to protect the condenser coils, refrigerant piping and control components from damage resulting from hail, flying debris, and vandalism. Louvered panels shall be fabricated from heavy gauge, pre-painted galvanized steel with a baked, polyurethane enamel finish, and be rigid enough to provide permanent protection for shipping and pre-/post- installation. Course wire mesh is not an acceptable material for coil guards.
- C. Corrosion Protected Condenser Coil Option - All aluminum microchannel condenser coil protection shall consist of a corrosion resistant coating that shall withstand ASTM B117 Salt Spray test for 6,000 hours and ASTM G85 A2 Cyclic Acidified Salt Fog test for 2,400 hours. This coating shall be added after coil construction covering all tubes, headers and fin edges, therefore providing optimum protection in more corrosive environments. Pre-coated fin stock is not acceptable. As an alternative to all aluminum microchannel condenser coil, units shall be provided with copper tubes and copper fins with corrosion protection as described herein.

2.05 MOTOR COMPRESSORS

- A. Compressors shall be industrial grade, energy efficient direct drive scroll type. The motor shall be of a suction gas cooled hermetic design. Reciprocating compressors are not acceptable. Compressor shall have oil sight glass and oil charging valve. Crankcase heaters will be standard on

each compressor to minimize amounts of liquid in the oil sump when unit is off. Provide with thermostatic motor winding temperature control to protect against excessive motor temperatures resulting from over-/under-voltage or loss of charge. Provide high and low pressure cutouts, and reset relay. Provide coil frost protection compressor unloading based on refrigerant circuit suction temperature to prevent coil frosting with minimum energy usage.

- B. Provide replaceable core, liquid line filter dryers with refrigerant isolation valves for all units larger than 75 tons. Dryer housings and isolation valves shall be located in the unit condenser section, and be easily accessible for routine service.

2.06 FANS

- A. Provide airfoil or forward curved type double width, double inlet supply fans with fixed-pitch drive assemblies. Provide thrust restraint isolation on the fan housing/fan board to assure smooth fan startup transition and operation. Dynamically balance all fans, and the unit's running fan assembly to assure smooth operation of the fans and associated assemblies. Balancing of the fan only shall not be acceptable. Mount fan motor(s) and fan(s) on a common base assembly and isolated from unit with 2" spring isolation.
- B. Provide all units with factory mounted and wired Variable Frequency Drives with bypass for all Supply Fans.

2.07 MODULATING GAS FIRED HEAT

- A. Provide modulating gas-fired heating section as a completely assembled and factory-installed heating system integral to unit, cULus approved specifically for outdoor applications for use downstream from refrigerant cooling coils. Provide capability for threaded gas piping connection through side on all units or bottom of unit on downflow supply and upflow return units.
- B. Forced-draft type burner with adjustable combustion air supply, gas valve, manual shut-off, direct spark or pilot ignition, and flame sensing monitoring electrode. Provide air proving switch to prevent burner operation when burner is open for maintenance or inspection. Combustion Blower: Provide centrifugal type fan with built-in thermal overload protection on fan motor.
- C. Provide factory pressure- and leak-tested tubular two pass heat exchanger of free-floating design manufactured of 16-gauge stainless steel primary surface and 16-gauge stainless steel secondary surface.

2.08 FILTER SECTION:

- A. Provide 2" throw away type filters with 90% arrestance rated in accordance with ASHRAE 52-76.

2.09 DDC MICROPROCESSOR CONTROLS

- A. Each unit shall be provided with a factory-installed, programmed and run-tested, stand-alone, microprocessor control system suitable for Single Zone VAV control or VAV control for use with VAV boxes. This system shall consist of temperature and pressure (thermistor and transducer) sensors, printed circuit boards, and a unit-mounted Human Interface Panel. The microprocessor shall be equipped with on-board diagnostics to indicate that all hardware, software, and all interconnected wiring and sensors are in proper operating condition. The microprocessor's memory shall be non-volatile EEPROM type, thus requiring no battery or capacitive backup to maintain all data during a power loss.
- B. Each unit shall be provided with a Human Interface Panel readily accessible for service diagnosis and programming without having to open the main control panel on the rooftop unit. Alphanumeric coded displays shall not be acceptable. Human Interface (HI) Panel - shall be a 16 key touch-sensitive membrane key switch panel, password protected to prevent use by unauthorized personnel. The Human Interface Panel display shall consist of a (2 line by 40 characters per line clear English display) or (4 line by 20 characters per line clear display). The display shall be Supertwist Liquid Crystal Display backlit LCD display.

2.10 ACCESSORIES

- A. Units shall come with factory installed 100% dry-bulb economizer with ultra-low leak dampers, barometric relief, and Factory Mounted Airflow Measurement Station equivalent to Trane TRAQ. Airflow Measurement Stations shall be capable of measuring full 100% unit airflow. Provide outside air intake hoods as required.
- B. Provide factory installed louvered steel coil guards for condenser coils and compressors as described in the Condenser Coil spec section.
- C. Provide factory installed, powered 15 amp, 115 V Ground Fault Interrupter Convenience Outlet wired and powered from a factory mounted transformer with unit mounted non-fused disconnect.
- D. Provide single point power connection with factory installed Non-Fused Disconnect.
- E. Provide factory installed phase and voltage monitoring system
- F. Provide factory installed low ambient cooling down to zero degrees F for all refrigerant cooling circuits utilizing VFD controlled condenser fans.

- G. Provide factory installed BacNet Interface
- H. Units tagged #15 and #16 shall be provided with TOP Supply and Horizontal return. Unit UL listing shall not be voided with TOP supply.
- I. Provide 5-year parts compressor warranty
- J. Provide Factory Start Up and First Year Parts and Labor Warranty

PART 3 EXECUTION:

- 3.01 Mount unit on structural aluminum or hot dipped galvanized seismic adaptor curb per Section 23 05 48 with flashing assembly that complies with the National Roofing Contractors Association requirements. The roof curb on the top elevation must be true and level. Contractor shall provide supplemental steel to attach curb to structure as recommended by Seismic Curb Manufacturer. See Specification Section 23 05 48 for product and design criteria.
- 3.02 Provide 1" Type "L" hard copper P-trap assembly at each condensate drain connection with threaded cleanout plug. Depth of trap shall be sufficient for drainage with static pressure of unit. Provide multiple condensate drains as required. Upsize condensate drains to 1 ½" if 2 or more drains are combined and route to nearest roof drain as indicated on plans.

END OF SECTION 23 74 20