**GENERAL**

Furnish and install Engineered Comfort Vertical Hi-Rise Direct Drive Fan Coil Units where indicated on the plans and in the specifications. Units shall be completely factory assembled, tested, and shipped as one piece. All units shall be capable of meeting or exceeding the scheduled capacities for cooling, heating, and air delivery. All unit dimensions for each model and size shall be considered maximums. Units shall be ETL listed in compliance with UL/ANSI Standard 1995, and be certified as complying with the latest edition of AHRI Standard 440.

**CONSTRUCTION**

All unit chassis shall be fabricated of heavy gauge galvanized steel panels able to meet 125-hour salt spray test per ASTM B-117. All exterior panels shall be insulated with 1/2" thick insulation with a maximum k value of .24 (BTU • in) / (hr • ft2 • °F) and rated for a maximum air velocity of 6000 fpm. Insulation must meet all requirements of ASTM C 1071 (including ASTM C 665), UL 181 for erosion, and carry a 25/50 rating for flame spread/smoke developed per ASTM E-84, UL 723, NFPA 90A, and NFPA 255.

**Option:** For units with multiple outlets, include an insulated sheet metal baffle inside the discharge plenum to break the sight lines between the two discharge outlets and to attenuate room noise that could be transmitted through the openings.

All units shall have decorator front panels fabricated of not less than 18-gauge galvanized steel. The front panel shall include a commercial grade return air grille and be attached with quarter turn quick open fasteners to allow for easy removal and access for service.

All exposed units shall have exterior panels fabricated of not less than 18-gauge galvanized steel. The front panel shall be attached with quarter turn quick open fasteners to allow for easy removal and access for service.

Provide an architectural grade double deflection aluminum discharge grille.

**Option:** Provide foil faced insulation in lieu of standard. Foil insulation shall meet or exceed the requirements stated above, and in addition meet ASTM Standards C-665 and C-1136 for biological growth in insulation. Insulation shall be lined with aluminum foil, fiberglass scrim reinforcement, and 30 pound Kraft paper laminated together with a flame-resistant adhesive. All exposed edges shall be sealed to prevent any fibers from reaching the air stream.

**Option:** Provide Elastomeric Closed Cell Foam Insulation in lieu of standard. Insulation shall conform to UL 181 for erosion and NFPA 90A for fire, smoke and melting, and comply with a 25/50 Flame Spread and Smoke Developed Index per ASTM E-84 or UL 723. Additionally, insulation shall comply with Antimicrobial Performance Rating of 0, no observed growth, per ASTM G-21. Polyethylene insulation is not acceptable.

**PAINTED FINISH**

All painted cabinet exterior panels shall be finished with a TGIC Polyester powder paint of the standard factory color.

**SOUND**

Units shall have published sound power performance level data derived from independent tests conducted in accordance with latest version of AHRI Standard 350.

**FAN ASSEMBLY**

Unit fan shall be dynamically balanced, forward curved, DWDI centrifugal type constructed of 18 ga. (1.31) galvanized steel for corrosion resistance. Motors shall be high efficiency, permanently lubricated sleeve bearing, permanent split-capacitor type with UL and CSA listed automatic reset thermal overload protection and three separate horsepower taps. Single speed motors are not acceptable.

Provide a blower panel to cover the entire fan assembly. The blower panel shall be tight fitting to prevent air bypass and prohibit accidental contact with the fan assembly. Units that allow accidental contact with the fan assembly with the decorator front panel removed are not acceptable.

The fan assembly shall be removed and serviced through the front and safety panels. The entire assembly shall be able to come out of the unit easily by removing four screws and unplugging the motor.

**COILS**

All cooling and heating coils shall optimize rows and fins per inch to meet the specified capacity. Coils shall have seamless copper tubes and shall be mechanically expanded to provide an efficient, permanent bond between the tube and fin. Fins shall have high efficiency aluminum surface optimized for heat transfer, air pressure drop and carryover.

All coils shall be tested at 360 PSIG air pressure, and rated for a maximum 300 PSIG working pressure at 200°F. All coils are pressure tested with a minimum 360 PSIG of dry air with higher test pressures performed as required.

Heating coils shall be furnished in the reheat position as standard.

All water coils shall be provided with a manual air vent fitting to allow for coil venting.

**Option:** Provide automatic air vents in lieu of manual air vents.

**Option:** Coil casing shall be fabricated from stainless steel.

**DRAIN PANS**

Primary condensate drain pans shall be single wall, heavy gauge galvanized steel for corrosion resistance, and extend under the entire coil section. Drain pans shall be of one-piece construction and be positively sloped for condensate removal. A P-Trap shall be furnished, factory piped to the condensate drain riser.

The drain pan shall be externally insulated with fire retardant, closed cell foam insulation. The insulation shall carry no more than a 25/50 Flame Spread and Smoke Developed Rating per ASTM E-84 and UL 723 and an Antimicrobial Performance Rating of 0, no observed growth, per ASTM G-21. The P-Trap shall be easily removed and serviced through the front panel.

**Option:** Provide a primary drain pan constructed entirely of heavy gauge type stainless steel for superior corrosion resistance. Stainless steel drain pans shall be externally insulated and meet or exceed the requirements stated above.

**FILTERS**

All units shall be furnished with a minimum 1" nominal glass fiber throwaway filter. Filters shall be tight fitting to prevent air bypass. Filters shall be easily removable from the return air opening with the front panel removed, without the need for tools.

**Option:** Provide unit with 1" (25) MERV 8 pleated filter.

**ELECTRICAL**

Units shall be furnished with single point power connection. Provide a terminal strip for motor and other electrical terminations. The factory mounted terminal wiring strip consists of a multiple position screw terminal block to facilitate wiring terminations for the electric control valves and thermostats.

**ELECTRIC HEAT**

Furnish an electric resistance heating assembly as an integral part of the fan coil unit, with the heating capacity, voltage and kilowatts scheduled. The heater assembly shall be rated for installation on the fan coil unit and be located so as not to expose the fan assembly to excessive leaving air temperatures that could affect motor performance.

The heater and unit assembly shall be listed for zero clearance and meet all NEC requirements, and be ETL listed with the unit as an assembly in compliance with UL/ANSI Standard 1995.

All heating elements shall be open coil type Ni-Chrome wire mounted in ceramic insulators and located in an insulated heavy gauge galvanized steel housing. All elements shall terminate in a machine staked stainless steel terminal secured with stainless steel hardware for corrosion resistance. The element support brackets shall be spaced no greater than 3-1/2" on center. All internal wiring shall be rated for 221°F minimum.

All heaters shall include over temperature protection consisting of an automatic reset primary thermal limit.

**Option:** Provide a manual reset secondary thermal limit.

All units with electric heat shall be provided with an incoming line power distribution block, designated to accept single point power wiring capable of carrying 125% of the calculated load current.

**PIPING PACKAGES**

Provide a standard factory assembled valve piping package to consist of a 2 or 3-way, on/off, motorized electric control valve and two ball isolation valves. Control valves shall be piped normally closed to the coil. Maximum entering water temperature on the control valve shall be 200°F, and maximum close-off pressure 25 PSIG. Maximum operating pressure shall be 300 PSIG.

Piping packages shall include stainless steel braided hoses to allow for thermal expansion within the unit cabinet. The hose shall be EPDM inner lined and Kevlar® reinforced, with stainless steel FNPT swivels and/or fittings. The hoses shall be rated for a maximum 450 PSIG working pressure at 250°F, and shall conform to NFPA 90A and carry no more than a 25/50 Flame Spread and Smoke Developed Rating, per ASTM E-84 and UL 723.

**Option:** Provide a 0-10 VDC modulating control valve (fail-in-place) in lieu of standard 2-position control valve with factory assembled valve piping package.

**Option:** Provide either a fixed or adjustable flow control device for each piping package.

**Option:** Provide pressure-temperature ports for each piping package.

Piping packages shall be completely factory assembled, including interconnecting pipe, and mounted inside the unit in a serviceable location over the coil and primary drain pan.

**RISERS**

Furnish chilled and hot water supply and return risers mounted to the unit. Risers shall be Type-M seamless copper tube and include swaged connections at the top for connection to the unit above. Slip couplings are not acceptable.

**Option:** Provide Type-L copper risers that meet or exceed the requirements stated above.

Risers shall be insulated with 1/2" closed cell foam insulation covering the entire riser. Insulation shall conform to NFPA 90A and carry no more than a 25/50 Flame Spread and Smoke Developed Rating, per ASTM E-84 and UL 723.

**Option:** Provide 3/4" closed cell foam insulation that meets or exceeds the requirements stated above.

Condensate drain risers shall be Type-M seamless copper tube and meet the requirements stated above.

**Option:** Risers shall be factory fabricated, bundled, and tagged separate from the fan coil units, allowing for shipment and installation of risers prior to the fan coil units. The riser tag must show the corresponding FCU tag, floor number, room number, riser number, CW, HW, and condensate pipe diameters. Refer to submittal drawing on ship separate/loose riser assembly.

**OUTSIDE AIR DAMPER**

**Option:** Provide a manual outside air damper with hand-locking quadrant.

**Option:** Provide a motorized outside air damper integral to the unit. The damper actuator shall be spring return closed.