# HIGH PERFORMANCE DIRECT DRIVE DRAW THROUGH FAN COIL UNITS - 35FH SERIES

1. - Furnish and install Engineered Comfort Model 35FH Series High Performance Horizontal Fan Coil Units where indicated on the plans and in the specifications.

2. - All units shall be Direct Drive – Draw Through configuration and 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 UL or ETL, listed in compliance with UL/ANSI Standard, and be certified as complying with the latest edition of AHRI Standard 440. Must meet the requirements of NFPA 90A and UL 181.

3.- All unit chassis shall be fabricated of heavy gauge galvanized steel panels able to meet 125 hour salt spray test per ASTM B-117. 18 ga. (1.3) galvanized steel channel frame. All panels surrounding the coil shall be insulated with 3/4" (19) thick closed cell fiber-free / foam and rated for air velocity of 6000 f.p.m. Insulation must meet all requirements of ASTM C1071 (including C665), UL 181 for erosion, and carry a 25/50 rating for flame spread/smoke developed per ASTM E-84, UL 723 and NFPA 90A. All other panels, surrounding the units, must also be acoustically and thermally insulated with a minimum of ¾" (19) of insulation with dual density insulation fiber glass insulation where all exposed edges are coated to prevent air erosion.

Unit cabinet shall have side and bottom full size access panels for ease of maintenance and service and motor blower removal. Access panels shall be attached to casing with screws.

Optional:

- Aluminum foil-faced insulation (steri-liner), meets ASTM Standards C-665 and C-1136 for biological growth in insulation. All exposed edges shall be sealed to prevent any fibers from reaching the air stream.

- Close cell fiber-free liner. 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.

- Perforated metal with steri-liner.

4. - Casing leakage shall not exceed 2% of rated airflow @ .5” w.g. (125 Pa). All units shall have a minimum 1 1/4" duct collar at the discharge.

5. - Unit shall be draw through type with fan dynamically balanced, forwardly curved; DWDI centrifugal type constructed of 18 gauge zinc coated galvanized steel for corrosion resistance. The fan assembly shall be easily removable for servicing the motor and blower at, or away from the unit. The entire fan assembly shall be able to come out of the unit by removing four nuts per fan and disconnecting the motor(s) wires.

6. - Motor shall be direct drive, isolated from blower and fan housing in at least four (4) locations with rubber isolators to eliminate any motor vibration being transmitted to the fan housing and duct. Motor shall be capable to be serviced through the bottom or side panel. Provide isolation between fan motor assembly and unit casing in at least four (4) locations to eliminate any vibration from the fan to the terminal unit casing. Motors shall be high efficiency, permanently lubricated sleeve bearing. Single speed motors are not acceptable. Motor wires shall be brought into external hinged door starter- control enclosure to facilitate wiring and service. Motors shall of the Permanent Split Capacitor type with UL and CSA listed automatic reset thermal overload protection and three separate horsepower taps.

Optional:

- ECM™ , Electronic Commutated Motors, factory-programmed and run-tested in assembled units with 3 speeds. Motor controller is mounted in a control box with a built-in integrated user interface. If adjustments are needed, motor parameters can be adjusted without factory service personnel at the motor control board. Motors will soft-ramp between speeds to minimize the acoustics due to sudden speed changes. Motors can be operated at either one, two or three speeds or with a factory or field-supplied variable speed controller. All motors have integral thermal overload protection with a maximum ambient operating temperature of 104°F. Motors are capable of starting at 50 percent of rated voltage and operating at 90 percent of rated voltage on all speed settings. Motors can operate up to 10 percent over voltage.

- EPIC ECM™, Electronic Commutated Motors, factory-programmed and run-tested in assembled units with fully variable speed capability. The motor designed for use with single phase power shall have a controller mounted in a control box with a built-in integrated user interface. If adjustments are needed, motor parameters can be adjusted without factory service personnel at the motor control board. Motors shall soft-ramp to programmed specific to minimize the acoustics due to sudden speed changes. Motors can be operated at the established range of airflows with a factory or field-supplied variable speed controller. All motors have integral thermal overload protection with a maximum ambient operating temperature of 104°F. Motors are capable of starting at 50 percent of rated voltage and operating at 90 percent of rated voltage on all speed settings. Motors can operate up to 10 percent over voltage.

7. - Sound

Units shall have discharge and radiated sound power levels published and tested in accordance with AHRI Standard 880.

8. - All water coils shall be AHRI410 certified and tagged with an HARI 410 label. All coils shall be pressure tested under water at 1.5 times the working pressure classification indicated in the Contract Documents, but the test pressure in no case shall be less than 300 psig. Coils shall have 1/2" O.D. seamless copper tubes, and collared and corrugated aluminum fins. Tube wall thickness of 0.016 to be standard. Coil frames shall be constructed of minimum G-90 galvanized steel. Water velocity in the tubes shall not exceed eight (8) feet per second and the coil face velocity shall not exceed 500 fpm.

For 4 pipe system a separate heating coils shall be furnished in the reheat position as standard.

Coils, header and drain pan shall be provided in a fully insulated integral casing with ¾” fiber-free/foam insulation to increase thermal efficiency and reduce casing leakage.

Optional:

- For 4 pipe system a separate heating coils shall be furnished in the preheat position as standard.

- Coil tube wall thickness of 0.025".

- All coils (without piping packages shall be provided with a manual air vent fitting to reduce potential air locks within coil.

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

9. - Primary condensate drain pans shall be heavy gauge galvanized steel, and extend under the entire cooling coil. Drain pans shall be of one-piece construction, have at least 1" height side and be positively sloped for condensate removal.

The drain pan shall be externally insulated with minimum 3/8” thick 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.

Optional:

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

- Provide a secondary drain connection on the primary drain pan for condensate overflow.

- Provide a condensate overflow switch in the primary drain pan for condensate overflow.

10. - Standard units can be ordered without filters.

Optional Filter:

- Unit to be furnished with a minimum 1" nominal glass fiber throwaway filter. Filters shall be tight fitting to prevent air bypass.

- Provide unit with 1" or 2" pleated filters rated at 25-30% efficiency and MERV 8 or 13 based on ASHRAE 52.2

- Unit shall be furnished with the FFR Ducted Filter Rack to facilitate the installation of inlet duct. FFR Filter Rack shall have hinged door flap with latch on the side and bottom to facilitate filter replacement.

11. - Electrical

Units shall be furnished with a hinged door starter-control enclosure and wired single point power connection. All power and control wiring shall conform to National Electric Code Standards. Within the control enclosure it shall include all required devices, including but not limited to, service switch, relay, control power transformers and control packages, low voltage remote shutdown relays, etc.

12. - 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 designed and rated for installation on the fan coil unit without the use of duct extensions or transitions, and be located in the unit as to not 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. A NEMA 1 enclosure with hinges shall be placed at the side of the fan coil to provide easy access. All motor wiring and heater terminates in the enclosure for single point electrical connection.

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 105°C minimum. All heaters shall include over temperature protection consisting of an automatic reset primary thermal limit and back up secondary thermal limit. All heaters shall be single stage unless noted otherwise on the plans. 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.

Automatic reset thermal cutouts and an airflow switch shall be furnished for heater protection. A Class 2 transformer shall be provided for low voltage control. The airflow switch shall prove adequate fan airflow before the electric heater can be energized. All devices shall be serviceable through the hinged enclosure and without removing heating element from the unit.

Optional

- Heating coils shall be controlled with the SCR option and proportional control to provide infinite heater control.

- 2 Stage Electric Heat shall be provided.

- Toggle Disconnect.

- Door Interlocking disconnect switch.

- Quieter operation option available.

- Power circuit fusing.

- Dust tight control enclosure.

- High grade Class A 80/20 nickel/chrome element wire.

- Manual reset secondary high limit corrosion resistance.

- Manual reset secondary high limit.

- Positive pressure air flow switch.

13.- Piping – Valve Packages

As optional

- Provide a factory assembled and installed valve piping package in a fully insulated integral casing with ¾" fiber-free/foam insulation to increase thermal efficiency and reduce casing leakage. Valve package shall consist of a 2 or 3 way, on/off, motorized electric control valve and two ball isolation valves. Maximum entering water temperature on the control valve shall be 200°F with a maximum operating pressure of 300 PSIG. Refer to Specification Section titled, "Pipes, Valves, Fittings and Accessories" for optional and accessories specifications.

- Provide 3-wire floating point modulating control valve (fail-in-place) in lieu of standard 2-position control valve with factory assembled valve piping package.

- Provide high pressure close-off actuators for 2-way on/off control valves.

- Provide a fixed-auto flow control device for each piping package with the specific gpm specified for the unit on the schedule.

- Provide a adjustable flow control device for each piping package.

- Provide unions and/or pressure-temperature ports for each piping package.

14.- Ultraviolet Light

As optional each unit shall be supplied with Ultraviolet Lights for disinfection for HVAC mold, bacteria & odor control. Fixture assembly to be installed at the coil discharge (downstream of the coil), between the coil and fan housing. Fixtureless lamps are to be installed in sufficient quantity and in such a manner so as to provide an equal distribution of UVC energy. The minimal UVC energy striking a surface shall be sufficient to continuously destroy a monolayer of mold and bacteria in less than six hours when at 55-135° F. The third party modeling shall include the destruction time for at least four of the most common fan coil surface microbes.

Lamp Clasps may be permanently or magnetically affixed to the irradiated cavity. They shall be constructed of high memory, plated steel for maximum holding power and corrosion resistance. Fixture shall be electrically terminated to within factory

supplied ballast housings to meet NEC and local codes. Lamps shall be mounted to irradiate the intended surface(s) as well as all of the available line of sight airstream by proper placement and incident angle reflection.

To protect maintenance personnel, all access panels and doors to the UVC assembly and/or within view of the UVC assembly must include mechanical interlock switch(es) to insure that the UVC assembly will be de-energized when any of these accesses are opened. For complete safety, the UVGI equipment shall have been tested, Listed and labeled as an integral part of the fan coil unit by the fan coil manufacturer, no exceptions.

15.- Controls

Controller and sensors provided by others but mounted and wired during unit assembly at the fan coil manufacturing facility.