

## **SECTION 230672 FAN COIL UNIT**

### **GENERAL**

Fan Coils: Direct-Driven Air Handling Units - 0.8 square feet to 3.2 square feet of coil face area.

PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION: Installation and wiring of thermostats and other control components.

Equipment Wiring Systems: Electrical connections to building equipment – Refer to Division 16.

REFERENCES: ANSI/NFPA 70 - National Electrical Code.

NFPA 90 A & B - Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating and Air Conditioning Systems.

UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

AHRI 350-2000 - Standard for Sound Rating of Non-Ducted Indoor Air-Conditioning Equipment.

ANSI S12.32 - Precision methods for the determination of sound power levels of discrete-frequency and narrow-band noise sources in reverberation rooms.

ASHRAE Standard 62-89R - Ventilation for acceptable indoor air quality.

UL 181 - Factory Made Air Ducts and Connectors.

QUALITY ASSURANCE: ISO 9001 Certification Unit designed and tested in compliance with AHRI 430 air delivery ratings per AHRI 430-1999.

Unit designed and tested in compliance with AHRI 260-2001.

SUBMITTALS: Submit unit performance data including: capacity, nominal and operating performance.

Submit Mechanical Specifications for unit and accessories describing construction, components and options.

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.

Submit data on electrical requirements. Include safety and start-up instructions.

Provide fan curves with specified operating point clearly plotted.

**REGULATORY REQUIREMENTS:** Units must be UL listed as a Fan-Coil Unit and meet UL 883 - Fan-Coil Units Standard for Safety requirements, and UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances. In the event the unit is not UL/CUL or ETL approved, the contractor shall, at his expense provide for a field inspection by a UL/CUL representative to verify conformance. If necessary, contractor shall perform modifications to the unit to comply with UL/CUL or ETL as directed by the representative, at no additional expense to the Owner.

Manufacturers must participate in the AHRI Certification program. Unit performance data must be rated in accordance with AHRI Standard 440, and must display the AHRI Symbol on all standard units. If a manufacturer does not participate in the AHRI Certification program, specified equipment must be witnessed by the engineer to meet the criteria of the specification.

Conform to UL1995 for internal wiring of factory-wired equipment.

**DELIVERY, STORAGE, AND HANDLING:** Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

Units shall ship fully assembled. Units not shipped fully assembled shall have tags on each section to indicate location and orientation in direction of airflow. Each section shall have lifting points to allow for field rigging and final placement of section

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

Deliver units to site with factory mounted piping package. If piping package is not factory installed, contractor shall be responsible for all expenses associated with installation, and leak testing the assembly.

**START-UP AND OPERATING REQUIREMENTS:** Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters in place, bearing lubricated (if applicable), condensate properly trapped, piping connections verified and leak-tested, all shipping braces removed, bearing set screws torqued (if applicable), and fan has been test run under observation.

Include manufacturers descriptive literature, operating instructions, installation instructions, maintenance and repair data, including filter replacement and unit lubrication schedule (if applicable).

**WARRANTY:** The equipment purchaser shall be provided, at no additional cost, a standard parts warranty that covers a period of one year from substantial completion. This warrants that all products are free from defects in material and workmanship and have capacities and ratings set forth in the equipment manufacturer's catalog and bulletins.

## PRODUCTS

SUMMARY: The contractor shall furnish and install units as shown and scheduled in the plans. The units shall be installed in accordance with this specification and produce the specified performance in accordance with AHRI Standard 550/590-98.

### Approved Manufactures:

Trane and McQuay

Manufacturer must clearly define any exceptions made to Plans and Specifications. Any deviations in layout or arrangement shall be submitted to engineer prior to bid date for approval. Mechanical Contractor is responsible for expenses that occur due to exceptions made.

GENERAL UNIT DESCRIPTION: Coils: Evenly spaced aluminum fins mechanically bonded to 3/8 inch [10mm] OD minimum copper tubes, designed for 300 psi and 200 degrees F [2,069kPa and 93 degrees C].

Cabinet Insulation: Acceptable cabinet insulation shall include:

Closed cell insulation or foil-faced insulation shall be the only acceptable material for insulating in accordance with ASHRAE 62-89R. Matted or fiber-glass insulation of any type is not acceptable.

Insulation shall meet UL rating 94-5v for fire hazard classification which satisfies flame and smoke safety requirements.

The exposed side shall be high density erosion proof material suitable for use in airstreams up to 4500 FPM.

Finish: Factory applied baked powder coat on visible surfaces of cabinet. Non-lead based paint must be used. To maintain a better long term appearance all bases, top control doors and grilles shall be black.

Fans: Centrifugal forward-curved double-width, double-inlet corrosion resistant wheels, statically and dynamically balanced, direct driven. Fans shall be constructed of metal with metal housing for long-term high reliability and shall be in the blow through configuration.

Motor: Resiliently mounted, factory run-tested permanent split capacitor type with integral thermal overload protection. Motor shall be provided with a keyed plug type connector for power leads that allows easy motor removal without removing power wires from terminals to facilitate unit cleaning and service.

Control: The controller shall be used as a stand-alone application. Controller shall be wall mounted zone sensor provided by the unit manufacturer to be mounted by the contractor. Manufacture shall include factory mounted 24V control transformer to be wired to the control box by contractor (wiring from zone sensor to fcu by contractor).

Wall Mounted Controller: A wall mounted sensor shall be provided with the following: Off/Auto, High, Medium, Low and Set-point Dial, by manufacturer. Also include a 24V control transformer that is factory wired and mounted in the FCU control box. Wiring (by others) between the unit and wall thermostat module is 24V. The unit shall require only a single point power connection (120V).

Features of Controller: Controller features shall include automatic heat/cool mode determination, occupied/unoccupied operation, random start and manual output test function.

All Input/Output abilities shall include:

- Binary Inputs: Low temperature detection, condensate overflow, occupancy.
- Binary Outputs: Fan high, medium, and/or low, cooling output, heating output, damper output.
- Analog Inputs: Zone temperature, set-point temperature, fan mode switch, entering water temperature, discharge air temperature.

Sequence of Operation with Valves: When sensor is in the "OFF" position, the fan is off and control valves closed. The Auto selection is used for fan cycling. The fan cycles with control valves to maintain set-point temperature. In cooling mode, the fan cycles from "OFF" to "MEDIUM" and in heating mode it cycles from "OFF" to "LOW". When no heating or cooling is required, the fan shall be "OFF". The fan shall be disabled when fan is not set to "AUTO". Cooling 3 way valve shall be 2 position. Heating 3 way valve shall be modulating control valve. Cooling control valve shall be normally Open and Heating control valve shall be normally Closed.

Deluxe Piping Packages: Provide complete factory-assembled, installed and leak tested under water at 450 psig [3,103kPa] piping package. The piping package and circuit setter shall include 3way valve, strainer, balancing valve, and ball valve supply and return. Bleed lines or ports will not be accepted. If piping package is shipped loose, the contractor is responsible for installing, and leak testing the piping package, without any additional cost to the owner.

Filter: Easily removable 1-inch [25mm] TA type, located before the coil.

Drain Pans: Primary condensate drain pans shall be single wall, heavy gauge galvanized steel for corrosion resistance, and extend under the entire cooling coil. Drain pans shall be of one-piece construction and be positively sloped for condensate removal. Drain pans on concealed models shall be field reversible for right or left hand connections. The drain pan shall be externally insulated with a 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.

Provide a single wall 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.

## EXECUTION

### EXAMINATION

Verify that surfaces are ready to receive work and opening dimensions.

Verify that required utilities are available, in proper location, and ready for use.

Beginning of installation means installer accepts existing surfaces.

### INSTALLATION

Install in accordance with manufacturer's instructions.

Install fan coil units as indicated. Coordinate to assure correct recess size for recessed units.

Protect units with protective covers during balance of construction.

Contractor is responsible for providing hydronic units with shut-off valve on supply and lockshield balancing valve on return piping, as well as float operated automatic air vents with stop valve.

Furnish copy of manufacturer's wiring diagram submittal. Verify that electrical wiring installation is in accordance with manufacturer's submittals and installation requirements of Division 16 sections.

### CLEANING

Clean work.

After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.

Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials available from manufacturer.

Contractor shall clean the coil and remove, clean, and reinstall the drain pan prior to turnover of the project. Assigned certificate or inspection by facility engineer is required prior to final contract payment is made.

Install new filters .