

SECTION 228220 - FAN-COIL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes fan-coil units and accessories.

1.3 SUBMITTALS

- A. Product Data: Include specialties and accessories for each unit type and configuration.
- B. Shop Drawings: Submit the following for each fan-coil unit type and configuration:
 - 1. Plans, elevations, sections, and details.
 - 2. Details of anchorages and attachments to structure and to supported equipment.
 - 3. Power, signal, and control wiring diagrams. Differentiate between manufacturer-installed and field-installed wiring.
 - 4. Equipment schedules to include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.
- C. Field Test Reports: Written reports of tests specified in Part 3 of this Section.
- D. Maintenance Data: For fan-coil units to include in maintenance manuals specified in Division 1. Include the following:
 - 1. Maintenance schedules and repair parts lists for motors, coils, integral controls, and filters.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
 - 1. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
 - 2. Fabricate pans and drain connections to comply with ASHRAE 62.1-2004.

3. Filter: MERV rating of 6 or higher.

C. ASHRAE 90.1-2013 Compliance: Applicable requirements in ASHRAE 90.1-2013, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.5 COORDINATION

A. Coordinate layout and installation of fan-coil units and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fan-Coil Unit Filters: Furnish **One** spare filter for each filter installed.
2. Slide out chassis: Furnish **One** spare fan belt for each unit installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Whalen.
2. McQuay International.
3. Rittling.
4. **Carrier**
5. Or Approved Equal.

2.2 CONFIGURATION

A. Vertical Units: An assembly, including: integral ECM fan with hydronic cooling/heating coil, integral supply, return and condensate drain risers and all accessories. Provide a slide out, removable hydronic chassis design that is not screwed or fastened to the cabinet. Chassis shall be base mounted and utilize a slide rail permitting removal by simply disconnecting two hoses and a polarized electrical plug. Designs simply incorporating hoses and multiple coil/chassis fastening devices are unacceptable. The chassis shall be shipped separately from the fan-coil cabinets to keep coils clean during construction, to allow risers to be flushed without fouling the coils, and to allow chassis to be install after all drywall, sanding, and painting is finished.

2.3 MATERIALS

A. CABINETS

1. The one-piece unit cabinet shall be fabricated of reinforced 22 gauge continuous G60 galvanized steel. All internal assemblies shall be welded and treated to prevent corrosion.
2. The cabinet shall be insulated with 1/2-inch thick 2-pound density thermal and acoustical fiberglass insulation having an integral water repellent, fungi and bacteria resistant barrier conforming to NFPA90A.
3. The cabinets shall be designed for direct attachment of gypsum wallboard.
4. Cabinets shall be provided in advance of the chassis, with openings protected by sheet metal covers to prevent construction debris from entering the cabinets.

B. COIL

1. The coil shall incorporate a manual air vent and be constructed of seamless copper tubing mechanically expanded into aluminum plate. Coil assembly shall be tested at the factory at not less than 320 PSIG.

C. RISERS

1. The unit shall incorporate a factory assembled type "M" copper supply, return and drain risers of suitable length to reach floor-to-floor without additional contractor furnished material. All risers shall be protected by a galvanized steel pipe chase the length of the cabinet. The supply and return risers shall be insulated the length of the cabinet with 1/2" thick Armaflex or equal closed cell insulation. The drain riser shall be factory insulated with 3/8" thick Armaflex or equal closed cell insulation the length of the cabinet.

D. DRAIN PAN

1. The drain pan shall collect and drain condensate that may form from any component internal to the fan coil unit and shall be fabricated of not less than 18 gauge continuous G90 galvanized steel. The copper condensate drain shall be rolled and soldered into the pan prior to coating of the pan with rustproof and waterproof fire rated mastic.

E. FANS

1. The fan shall be slow speed forward curved centrifugal type, and shall be accessible for removal and maintenance through the return air opening.

F. MOTORS

1. Motor shall be of the brushless DC electrically commutated (EC) motor, suitable for the current characteristics shown on the drawings. PSC motors are NOT acceptable.
2. Comply with requirements in Section "Motors."
3. Motors shall have integral thermal-overload protection and resilient mounts.
4. Wiring Terminations: Connect motor to chassis wiring with plug connection

G. SUPPLY GRILLES

1. The supply grilles shall be of the double deflection type fabricated of **factory white painted extruded aluminum**. All supply openings shall be painted black with a damper assembly and sight baffle provided when one unit is serving two separate rooms.

H. RETURN AIR PANEL

1. The return air opening shall be covered with a factory white painted extruded aluminum hinged return air grille that is attached directly to the unit with two screws and incorporates quick removal fasteners for easy filter maintenance.

I. POWER SUPPLY

1. The unit manufacturer shall furnish a single source single point power connection for the fan. Power connections are made to the unit junction box through a 7/8" knockout located on both the left and right sides of the unit as shown on the drawings.

J. DISCONNECT

1. Each unit shall include a non-fused disconnect switch, factory mounted and wired.

K. CONTROL SYSTEMS

1. See drawings for control schematics and sequence of operation. See specification Section "Automatic Temperature Controls.

L. SOURCE QUALITY CONTROL

1. Test and rate units according to ARI 440.
2. Test unit coils according to ASHRAE 33.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive fan-coil units for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before fan-coil unit installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install fan-coil units level and plumb.
- B. Install fan-coil units to comply with NFPA 90A.
- C. Suspend fan-coil units from structure with rubber-in-shear vibration isolators (rubber hangers). Vibration isolators are specified in Section "Mechanical Vibration Controls and Seismic Restraints."

- D. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other mechanical Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Unless otherwise indicated, install shutoff valve and union or flange at each connection.
- C. Install piping adjacent to machine to allow service and maintenance.
- D. Ground equipment.
- E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality-control testing and report results in writing:
 - 1. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 - 3. Test and adjust controls and safeties.
- B. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.5 CLEANING

- A. After installing units, inspect unit cabinet for damage to finish. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. After installing units, clean fan-coil units internally according to manufacturer's written instructions.
- C. Install new filters in each fan-coil unit within two weeks after Substantial Completion.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fan-coil units.
 - 1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.

2. Review data in maintenance manuals. Refer to Division 1 for Closeout Procedures and Division 1 for Operation and Maintenance Data.
3. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION 238220