

## **SECTION 23 82 19 - FAN COIL UNITS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

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

#### **1.2 SUBMITTALS**

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Field quality control test reports.
- D. Operation and maintenance data.

#### **1.3 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.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
  - 1. Trane Co. (The); Unitary Products Group
  - 2. Environmental Technologies
  - 3. First Co.
  - 4. Pace
  - 5. Energy Labs
  - 6. York International Corp.
  - 7. Carrier Corporation, a United Technologies company
  - 8. Airtherm – A Mestek Co.

## 2.2 FAN COIL UNITS

- A. Description: Factory packaged and tested units rated according to ARI 440, ASHRAE 33, and UL 1995.
- B. Coil Section Insulation: 1 inch thick, [**coated glass fiber**] [**foil-covered, closed-cell foam**] [**matte finish, closed cell foam**] complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
  - 1. Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame spread index of 25 and smoke developed index of 50 when tested according to ASTM E 84.
- C. Main and Auxiliary Drain Pans: [**Stainless steel**] [**Insulated galvanized steel with plastic liner**] formed to slope from all directions to the drain connection as required by ASHRAE 62.[ **Drain pans shall be removable**].
- D. Chassis: Galvanized steel where exposed to moisture. Floor mounting units shall have leveling screws.
- E. Cabinet: Steel with baked enamel finish in manufacturer's standard paint color as selected by Owner.
  - 1. Vertical Unit Front Panels: Removable, steel, with integral stamped steel discharge grille and channel formed edges, cam fasteners, and insulation on back of panel.
  - 2. Horizontal Unit Bottom Panels: Fastened to unit with cam fasteners and hinge and attached with safety chain; with integral stamped cast aluminum discharge grilles.
  - 3. Steel recessing flanges for recessing fan coil units into ceiling or wall.
- F. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
  - 1. Pleated Cotton-Polyester Media: 90 percent arrestance and 7 MERV.
- G. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain valve.
- H. Electric-Resistance Heating Coils: Nickel chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized steel housing; with fuses in terminal box for overcurrent protection and limit controls for high-temperature protection. Terminate elements in stainless steel machine staked terminals secured with stainless-steel hardware.
- I. Fan and Motor Board: Removable.
  - 1. Fan: Forward curved, double width, centrifugal; directly connected to motor. Thermoplastic or painted steel wheels, and aluminum, painted steel, or galvanized steel fan scrolls.

2. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board. Comply with requirements in Division 23 Section "Electric Motors for Mechanical Equipment."
  3. Wiring Termination: Connect motor to chassis wiring with plug connection.
- J. Factory, Hydronic Piping Package: ASTM B 88, Type L copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet, and outlet.
1. **[Two] [Three]**-way, **[two-position] [modulating]** control valve for chilled-water coil.
  2. **[Two] [Three]**-way, **[two-position] [modulating]** control valve for heating coil.
  3. Hose Kits: Minimum 400-psig working pressure, and operating temperatures from 33 to 211 deg F. Tag hose kits to equipment designations.
    - a. Length: 24 inches.
    - b. Minimum Diameter: Equal to fan coil unit connection size.
  4. Two Piece Ball Valves: Bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and 600 psig minimum CWP rating and blowout-proof stem.
  5. Calibrated Orifice Balancing Valves: Bronze body, ball type; 125-psig working pressure, 250-deg F maximum operating temperature; with calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, threaded ends, and equipped with a memory stop to retain set position.
  6. Automatic Flow Control Valve: Brass or ferrous-metal body; 300-psig working pressure at 250 deg F, with removable, corrosion-resistant, tamperproof, self-cleaning piston spring; factory set to maintain constant indicated flow with plus or minus 10 percent over differential pressure range of 2 to 80 psig.
  7. Y-Pattern Hydronic Strainers: Cast iron body (ASTM A 126, Class B); 125 psig working pressure; with threaded connections, bolted cover, perforated stainless steel basket, and bottom drain connection. Include minimum NPS 1/2 hose end, full port, ball type blowdown valve in drain connection.
  8. Wrought-Copper Unions: ASME B16.22.
- K. Control devices and operational sequences are specified in Division 23 Section "Direct Digital Control (DDC) System".
- L. Electrical Connection: Factory wire motors and controls for a single electrical connection.

## 2.3 DUCTED FAN COIL UNITS

- A. Description: Factory packaged and tested units rated according to ARI 440, ASHRAE 33, and UL 1995.
- B. Coil Section Insulation: 1 inch thick **[coated] [foil faced]** glass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
1. Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame spread index of 25 and smoke developed index of 50 when tested according to ASTM E 84.
- C. Drain Pans: **[Stainless steel] [Insulated galvanized steel with plastic liner]** formed to slope from all directions to the drain connection as required by ASHRAE 62.1.

- D. Chassis: Galvanized steel where exposed to moisture, with baked enamel finish and removable access panels.
- E. Cabinets: Steel with baked enamel finish in manufacturer's standard paint color.
  - 1. Supply Air Plenum: Sheet metal plenum finished and insulated to match the chassis with mill finish, aluminum, double deflection grille.
  - 2. Return Air Plenum: Sheet metal plenum finished to match the chassis.
  - 3. Mixing Plenum: Sheet metal plenum finished and insulated to match the chassis with outdoor and return air, formed steel dampers.
  - 4. Dampers: Galvanized steel with extruded vinyl blade seals, flexible metal jamb seals, and interlocking linkage.
- F. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
  - 1. Pleated Cotton Polyester Media: 90 percent arrestance and 7 MERV.
- G. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 200 psig and a maximum entering water temperature of 220 deg F. Include manual air vent and drain.

**OR**

- H. Electric-Resistance Heating Coils: Nickel chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized steel housing; with fuses in terminal box for overcurrent protection and limit controls for high temperature protection of heaters. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
- I. Belt-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, single speed motor installed on an adjustable fan base resiliently mounted in the cabinet. Aluminum or painted steel wheels, and painted steel or galvanized steel fan scrolls.
  - 1. Motors: Comply with requirements in Division 23 Section "Electrical Motors for Mechanical Equipment."
- J. Factory, Hydronic Piping Package: ASTM B 88, Type L copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet, and outlet.
  - 1. [Two] [Three]-way, [two-position] [modulating] control valve for chilled-water coil.
  - 2. [Two] [Three]-way, [two-position] [modulating] control valve for heating coil.
  - 3. Hose Kits: Minimum 400-psig working pressure, and operating temperatures from 33 to 211 deg F. Tag hose kits to equipment designations.
    - a. Length: 24 inches.
    - b. Minimum Diameter: Equal to fan coil unit connection size.
  - 4. Two Piece Ball Valves: Bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and 600 psig minimum CWP rating and blowout-proof stem.

5. Calibrated Orifice Balancing Valves: Bronze body, ball type; 125 psig working pressure, 250 deg F maximum operating temperature; with calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, threaded ends, and equipped with a memory stop to retain set position.
  6. Automatic Flow Control Valve: Brass or ferrous metal body; 300 psig working pressure at 250 deg F; with removable, corrosion resistant, tamperproof, self-cleaning piston spring; factory set to maintain constant indicated flow with plus or minus 10 percent over differential pressure range of 2 to 80 psig.
  7. Y-Pattern Hydronic Strainers: Cast iron body (ASTM A 126, Class B); 125-psig working pressure, with threaded connections, bolted cover, perforated stainless steel basket, and bottom drain connection. Include minimum NPS 1/2 hose end, full port, ball type blowdown valve in drain connection.
  8. Wrought-Copper Unions: ASME B16.22.
- K. Control devices and operational sequence are specified in Division 23 Sections "Direct Digital Control (DDC) System".
- L. Electrical Connection: Factory wire motors and controls for a single electrical connection.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install fan coil units to comply with NFPA 90A.
- B. Suspend fan coil units from structure with elastomeric hangers. Vibration isolators are specified in Division 23 Section "Vibration and Seismic Controls for Mechanical Piping and Equipment."
- C. Install new filters in each fan coil unit within two weeks after Substantial Completion.
- D. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:
  1. Install piping adjacent to machine to allow service and maintenance.
  2. Connect piping to fan coil unit factory hydronic piping package. Install piping package if shipped loose.
  3. Connect condensate drain to indirect waste.
    - a. Install condensate trap of adequate depth to seal against the pressure of fan. Install cleanouts in piping at changes of direction.
- E. Connect supply and return ducts to fan coil units with flexible duct connectors specified in Division 23 Section "Air Duct Accessories." Comply with safety requirements in UL 1995 for duct connections.

### 3.2 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: 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 safety devices. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

**END OF SECTION 23 82 19**