

Electric Coil [Make-Up Air / Displacement Ventilation / Space Heating] System

Note: Optional items and/or items requiring a choice, are shown between brackets and/or parentheses with selections separated by a forward slash, i.e.[a / b / c].

Part 1: GENERAL

1.1 *Section Includes:*

- A. Electric Coil Heaters
- B. Controls
- C. Equipment Schedule

1.2 *Related Sections:*

- A. Section 01655: Starting up mechanical systems
- B. Section 15990: Testing, adjusting and balancing
- C. Section 16050: Basic electrical materials and methods

1.3 *References:*

- A. **ETL Testing Laboratories:** Independent testing facility certifies standards conformance.
- B. **American Conference of Governmental Hygienists (ACGIH):** Establishes air quality standards.
- C. **Environmental Protection Agency (EPA):** Enforces outdoor air quality standards.
- D. **Occupational Safety & Health Administration (OSHA):** Enforces air quality standards and safety in the work place.
- E. **National Electric Code (NEC):** Establishes electrical standards.
- F. **Underwriters Laboratory (UL):** Independent testing facility certifies component conformance to appropriate standards.
- G. **National Fire Protection Agency (NFPA):** Establishes fire prevention standards.
- H. **Sheet Metal & Air Conditioning Contractors National Association (SMACNA):** Covers sheet metal fabrication and insulation standards.

1.4 *Quality Assurance:*

Manufacturer shall:

- A. Provide an electric heating coil manufactured in conformance to UL standards.
- B. Provide electric coil heating equipment that does not exceed contaminant threshold limits for safe environment, as established by the ACGIH.
- C. Furnish proof, satisfactory to the owner (or its representative), of having manufactured temperature modulating electric coil heating systems for a minimum of 10 years.
- D. Make its facility available to owner or his representative for quality control audit without prior notification.

1.5 Submittals:

- A. Manufacturer shall submit product data, including dimensions, duct & service connections, accessories, controls with schematics and sequence of operation, electrical nameplate data, wiring diagrams, fan curves, electric coil, and filter data.
- B. Manufacturer shall furnish rigging, assembly, and installation instructions.
- C. Manufacturer shall furnish Operation & Maintenance Manuals, including descriptive literature, operation instructions, maintenance and repair data, and parts listing.

2.1 Acceptable Manufacturer's:

AbsolutAire, Inc. (Kalamazoo, MI) (800) 804-4000

2.2 Electric Coil Heaters:

Manufacturer shall:

- A. Provide an electric coil [Rooftop / Horizontal / Suspended / Upright] heater with [80%/20% Recirculation with variable OA/RA feature for building pressurization] [100% Outside Air {constant volume / variable volume / 2-speed}] capability.
- B. Provide self-contained packaged heaters that shall include the casing, electric coil with [staged / SCR modulating] temperature control, non-overloading fan, fan motor & drives, [mixing chamber; positive position variable outdoor air/return-air dampers]; [variable frequency drive capable of XX% supply air reduction] [and automatic controls for pressure].
- C. Provide a casing, which shall be a minimum 18-gauge, aluminized steel, (16-gauge on AA7 & AA8) welded to structural steel framing. Both interior and exterior structural steel shall be red-oxide primed. All exterior casing seams shall be weather resistant. All

interior and exterior surfaces will be cleaned of all oil and grease. Painted exterior will consist of a high-quality prime coat and a finish coat of machine enamel with rust inhibitors. Color is selected by the owner. [All interior surfaces will be lined with 1-inch thick, 1-1/2 pound density, coated fiberglass when specified. The insulation shall comply with UL standard 181 for erosion and NFPA 90A for fire resistance. All exposed edges will be coated to eliminate erosion. Fiberglass will be held in place with both adhesive and welded pins, per SMACNA standards.] Provide a minimum of (2) hinged access doors with positive latching, watertight handles (not available on AA1700 or AA3000). All weather enclosure doors shall be painted on the interior as well as the exterior and shall include braces that lock the door open during servicing.

D. **Supply fan:** shall be a double-width, double-inlet, centrifugal design, belt driven for the required air capacity. The motor shall be 1750 rpm, standard NEMA frame, [Open Drip Proof (ODP) / Totally Enclosed Fan Cooled (TEFC) / EPACT compliant / Premium Efficient] mounted on an adjustable pivot base. The motor shall have a 1.15 service factor, suitable for continuous service at 120° F ambient temperature, and shall be wired for the specified voltage. The fan, motor, and drive shall be factory tested to ensure the specified air delivery (per ANSI standards) at the design total static pressure. The fan shaft shall be connected to the motor by a V-belt drive, capacity designed for 30% over the motor nameplate horsepower. The fan shaft shall be a turned, ground and polished solid shaft. A protective coating shall be applied to the shaft to minimize oxidation. Fan shall have ball bearings, and shall be designed for a minimum L10 life of 100,000.

E. **Controls:**

a. **Main Control Panel:** shall be similar to NEMA 3R and contain all standard electrical components, such as [non] fused disconnect switch; motor starter; 120-volt and 24-volt transformers; control circuit fuses; and a number-coded terminal strip.

b. **Temperature Controls:**

i. **Discharge Temperature Control:**

A solid state temperature control system, located inside the control panel includes a sensing thermistor located in the supply fan discharge opening. The thermistor senses and controls discharge temperature. The temperature control for adjusting the discharge air temperature is located at [the main unit] [the remote panel].

ii. **Space Temperature Control:**

A solid-state temperature control system, located inside the control panel, shall have a sensing thermistor located in the space as shown on the plans. The thermistor senses and controls the room temperature in the occupied mode. A second thermistor, mounted in the heater discharge, controls the

allowable maximum and minimum discharge temperature in response to the actual discharge temperature being sensed.

c. **Automatic Building Pressure Control [with Manual Override]:**
(80% / 20% Recirculating Units)

The heater shall incorporate a separate outdoor-air / return-air mixing chamber, containing two (2) sets of 16-gauge galvanized multi-blade dampers, interlinked to work opposite each other. Each damper shall control up to 80% of the total heater fan volume. These dampers shall provide a total outdoor air turndown ratio of 5- to-1 by a proportional control means as outlined herein. This damper control shall be through a manual (potentiometer control) or an automatic (building pressure sensitivity control) outdoor-air/return-air proportional adjustment control. An automatic pressure control, linked to the outdoor-air / return-air dampers, is used to sense the room pressure. This [diaphragm/photohelic] switch is mounted on the heater. The pressure sensing range shall be 0.01” to 0.20” W.C., with a null span of 0.02” to 0.03” W.C. A manual/automatic selector override switch shall be provided to allow personnel to select manual or automatic control. A potentiometer shall be located inside the remote control panel for manual control.

d. **Remote Control Panel:** shall be provided and includes all necessary remote operating switches and circuit analyzer lights. The remote control panel shall be painted mild steel. Wiring to remote panel from the main control panel shall be accomplished with 120/1/60 and/or 24 volt wiring circuits.

The remote control panel shall provide each heater with the following (choose):

- i. a manual pressure-control potentiometer,
 - ii. an occupied room temperature stat. (The stat room sensor shall be remote mounted where noted on the plan),
 - iii. a room-temperature unoccupied cycle stat (the stat sensor remote shall be mounted where noted on the plan),
 - iv. a programmable 7-day time clock with a minimum of four (4) programmable on/off schedules per day, with battery back-up reserve.
 - v. a [tamper proof, key operated] Summer/Off/Winter switch,
 - vi. a [tamper proof, key operated] manual/auto building pressure selector switch and,
 - vii. These system circuit analyzer lights:
 1. Power On
 2. Fan On
 3. Heat On
 4. Low Temperature Alarm
- e. **Low-Temperature Limit Switch:** turns the fan motor off when cold air is being discharged from the heater. The minimum discharge temperature may be selected

from 0°F to 70°F. An integral timer shall by-pass this switch for five (5) minutes on initial start-up.

- f. **High-Temperature Limit Switch:** turns the heat off when the discharge air temperature exceeds 130°F. The switch must then be manually reset at the heater.

2.3 *Accessories (select each optional accessory needed):*

Manufacturer shall (provide the following accessories):

- A. **Filtered Inlet Hood:** this option includes filters accessible from the inlet hood face. Filters are a [1" / 2"] aluminum mesh washable filter. [Provide a clogged filter warning (light / alarm / photohelic gauge) at the main (remote) control panel].
- B. **Inlet Hood with Bird Screen:** manufactured using the same gauge and metal type as the base unit and includes ½" x ½" galv. bird screen.
- C. **Side Access Filter Section:** manufactured using the same gauge and metal type as the base unit and is field attached at the unit inlet (entering air) end. [All interior surfaces will be lined with 1-inch thick, 1-1/2 pound density, coated fiberglass when specified. The insulation shall comply with UL standard 181 for erosion and NFPA 90A for fire resistance. All exposed edges will be coated to eliminate erosion. Fiberglass will be held in place with both adhesive and welded pins, per SMACNA standards.] Filters are to be [{1" / 2"} aluminum mesh washable / 2" 30% pleated/disposable / 1-1/2" polyester media filter with and internal galvanized frame]. [Provide a clogged filter warning (light / alarm / photohelic gauge) at the main (remote) control panel]. Filters are UL Class 2.
- D. **Variable Frequency Drive:** variable volume 100% OA models include an automatic building pressure control and a variable frequency drive (VFD) for supply fan speed control. Includes a building pressure differential switch to signal the VFD to vary fan speed as needed in response to the building negative or positive conditions. This diaphragm [photohelic] switch is mounted in the heater main control panel. The pressure sensing range shall be 0.01 to 0.20" W.C. with a null span of 0.01" to 0.03" W.C.
- E. **Roof Curb (horizontal units):** provide a [full-perimeter curb / duct supply-air curb], 20" high [flat, pitched] curb, formed of heavy-gauge aluminized steel. Contractor shall shim the curb so that it is level and shall install a cant strip and wood nailer per detail on the plans. [Manufacturer to provide {1" foil face fiberglass} {1" therma-fiber} insulation on curb interior, glued and pinned as required.] [Manufacturer to provide 1" wood-nailer and cant strip.]
- F. **Motorized [Inlet / Discharge] Damper:** a parallel blade [low leak] [spring return] damper is provided in a flange assembly shipped loose for field installation by others. Includes a 24-volt direct coupled actuator with a pre-wired cable.

- G. **Gravity [Inlet / Discharge] Damper:** a parallel blade damper is provided in a flange assembly which is shipped loose for field installation by others. Damper blades are constructed of fabricated aluminum and have adjustable weights for balancing.
- H. **Service Platform:** unit shall be furnished with a service platform, running the full length (width) of the heater, which shall be constructed of corrosion resistant 16-gauge multi-grip floor plate with an OSHA-approved handrail and steel safety chains at each end.
- I. **Vibration Isolators:** shall consist of a steel housing and an isolation element, molded entirely of a colored oil-resistant neoprene stock for easy identification of capacity. The hangers shall have a deflection of 1/4" or less and will be supplied by the heater manufacturer.
- J. **Discharge Splash Plate (where noted on plans):** shall be provided with heaters, as shown on the plans. These plates are to be constructed of 16-gauge corrosion resistant steel, reinforced with angle iron, painted by the manufacturer. Contractor shall supply all necessary hanger rods and shall install discharge plate in accordance with manufacturer's recommendations.
- K. **Discharge Diffuser:** shall be provided and will include horizontal [and vertical] blades. The diffuser will be constructed such that it discharges supply air in 3 [4] directions and will be constructed of a minimum of 16-gauge aluminized steel. The directional blades will be 14-gauge aluminized steel and will be field adjustable and are able to be locked into place. [4-way discharge heads shall be provided with insulation (1"-1-1/2#) installed on the interior floor area for noise reduction].