SECTION 238216.14 - ELECTRIC-RESISTANCE AIR COILS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section Includes:

Electric-resistance air coils.

* + - * 1. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 238216.11 "Hydronic Air Coils" for air coils using water as the heating or cooling medium.

Section 238216.12 "Steam Air Coils" for air coils using steam as the medium.

Section 238216.13 "Refrigerant Air Coils" for air coils using refrigerants as the medium.

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each type of product.

Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each air coil.

Include rated capacities, operating characteristics, and pressure drops for each air coil.

* + - * 1. Shop Drawings: Include diagrams for power, signal, and control wiring.

Retain "Coordination Drawings" paragraph below for situations where limited space necessitates maximum utilization for efficient installation of different components or if coordination is required for installation of products and materials by separate installers. Coordinate paragraph with other Sections specifying products listed below. Preparation of coordination drawings requires the participation of each trade involved in installations within the limited space.

* + - * 1. Coordination Drawings: Floor plans, sections, and other details, or BIM model, drawn to scale, showing the items described in this Section and coordinated with all building trades.

Retain "Field quality-control reports" paragraph below if Contractor is responsible for field quality-control testing.

* + - * 1. Field quality-control reports.
			1. CLOSEOUT SUBMITTALS
				1. Operation and Maintenance Data: For air coils to include in operation and maintenance manuals.
			2. FIELD CONDITIONS
				1. Altitude above Mean Sea Level: <Insert feet>.
1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or AVITRU. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. PERFORMANCE REQUIREMENTS
				1. Coil Assembly: Comply with UL 1995.
				2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
				3. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of air-handling units and components.

"ASHRAE 62.1 Compliance" paragraph below may be required to comply with Project requirements or authorities having jurisdiction.

* + - * 1. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5, "Systems and Equipment," and Section 7, "Construction and Startup."
				2. Equally balance heater electrical load for each step across all electrical phases.
				3. Part-Load Operation: Provide arrangement with operation staged for uninterrupted operation over the full range of airflow down to the minimum airflow indicated.

If Project has more than one type or size of electric coil, delete "Capacities and Characteristics" paragraph below and schedule coils on Drawings.

* + - * 1. Capacities and Characteristics:

Coil Face Dimensions:

Length: **<Insert inches>**.

Height: **<Insert inches>**.

Mounting: **[Slip in] [Flanged]**.

Air Side:

Flow Rate: **<Insert cfm>**.

Face Velocity: **<Insert fpm>**.

Static Pressure Drop: **<Insert inches wg>**.

Total Capacity: **<Insert Btu/h>**.

Entering Temperature: **<Insert deg F>**.

Leaving Temperature: **<Insert deg F>**.

Electrical Characteristics:

Capacity: **<Insert kilowatts>**.

Number of Steps: **<Insert number>**.

Volts: **<Insert value>**.

Phase: **<Insert value>**.

Hertz: **<Insert value>**.

Full-Load Amperes: **<Insert value>**.

Minimum Circuit Ampacity: **<Insert value>**.

Maximum Overcurrent Protection: **<Insert amperage>**.

* + - 1. ELECTRIC-RESISTANCE AIR COILS
				1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Brasch Manufacturing Co., Inc.

Chromalox, Inc.

INDEECO.

Approved equivalent.

* + - * 1. Source Limitations: Obtain electric-resistance air coils from single source from single manufacturer.
				2. Heating Elements:

Retain "Open Elements" or "Finned Tubular Elements" subparagraph below. If more than one heater type is required, indicate heater types on the Drawings. Finned tubular heaters are more durable, but they are higher cost than open-element heaters.

Open Elements:

Open-coil resistance wire of 80 percent nickel and 20 percent chromium; supported and insulated by floating ceramic bushings recessed into casing openings, fastened to supporting brackets, and mounted in a frame.

Safety Screens: Install safety screens to protect operators from accidentally coming into direct connect with elements.

Finned Tubular Elements:

Coiled resistance wire of 80 percent nickel and 20 percent chromium; center-mounted and surrounded by compacted magnesium-oxide powder in tubular-steel sheath; with spiral-wound, copper-plated, steel fins continuously brazed to sheath.

Finish finned tubular elements with a baked-on aluminum paint, and mount in a frame.

Each element individually removable from terminal box.

Use threaded stainless steel element terminals and hardware.

* + - * 1. Frame: **[Galvanized] [stainless] [or] [aluminized]** steel; minimum **[0.052 inch] [0.064 inch] [0.079 inch] <Insert thickness>** thick for **[slip-in] [flanged]** mounting. Include intermediate element support brackets equally spaced at a maximum of **[36 inches] <Insert distance>** o.c. across electric-resistance air coil.

Retain third option in "Terminal Box/Control Panel" paragraph below, where mounting arrangements vary.

* + - * 1. Terminal Box/Control Panel: **[Unit mounted] [Remote mounted] [Unit or remote mounting arrangement indicated on Drawings]**; with disconnection means and overcurrent protection.

Enclosure: NEMA 250, **[Type 1] [or] [Type 12] <Insert type>** enclosure complying with UL 50.

Full-face-hinged door**[ with lock and key latching device(s)]**.

Factory insulate terminal box to prevent condensation from occurring within box.

Install a laminated elementary wiring diagram on inside face of heater control panel door or in another protected location than visible be service personnel. Wiring diagram to match installation.

* + - * 1. Controls:

Safety Controls: Each heater is to be provided with the following factory-mounted safety controls:

Disk-type thermal cutout switch with automatic reset.

Primary linear thermal limit cutout switch with automatic reset.

Secondary linear thermal limit cutout switch with local manual reset.

Airflow Proving Switch: Pressure differential type; with pressure range selected to ensure reliable operation throughout full range of air-handling unit airflow down to minimum airflow indicated.

Staging Control: Magnetic contactors for switching stages of heat.

Retain "SCR Control" subparagraph below to require a proportional heat output for more refined temperature control. For large-capacity heaters, SCR control is included in conjunction with stage control to provide stepless operation.

SCR Control: Silicone-controlled rectifier (SCR) for 100 percent stepless capacity control.

Remote Monitoring and Control: Include control devices necessary to interface with remote-control signals, including the following:

Retain any of first five subparagraphs below.

Heater on/off control.

Monitoring heater on/off status.

High-temperature alarm.

Low-airflow alarm.

Heater capacity control.

**<Insert requirement>**.

* + - * 1. Electrical:

Single-Point Field Power Connection: Install and wire the heater to accommodate a single field electrical connection for electrical power.

Disconnecting Means: Provide each heater with a main electrical power connection, door mounted and interlocking, and disconnecting means to prevent access into panel, unless switched to the off position.

**[Fused disconnect switch] [Nonfused disconnect switch] [Circuit breaker]** with lockable handle.

Minimum Short-Circuit Current Rating: As required by electrical power distribution system, but not less than **[42,000] [65,000] <Insert number>** A.

Factory install and wire branch circuit fusing or circuit breakers in accordance with NFPA 70.

Pilot Lights: Include labeled pilot lights on face of control panel for the following:

Retain any of first four subparagraphs below.

Power on.

Low-airflow alarm.

High-temperature alarm.

One for each stage on.

**<Insert requirement>**.

Terminations: Wire terminations and field interface terminations to labeled terminal strips.

Control Transformer: Size control circuit transformer for load.

Labeling: Label each electrical device with a laminated phenolic tag.

Use only NRTL-labeled electrical components.

* + - * 1. Nameplate: Include the following data:

Retain any of first five subparagraphs below.

Manufacturer name, address, telephone number, and website address.

Manufacturer model number.

Serial number.

Manufacturing date.

Coil identification (indicated on Drawings).

**<Insert requirements>**.

Retain one of first two paragraphs below.

* + - * 1. See Section 230923.27 "Temperature Instruments" for thermostat.
				2. Thermostats: Wall-mounted thermostats, with temperature range from 50 to 90 deg F, and 2.5 deg F throttling range.
1. EXECUTION
	* + 1. EXAMINATION
				1. Examine ducts, plenums, and casings to receive air coils for compliance with requirements for installation tolerances and other conditions affecting coil performance.
				2. Proceed with installation only after unsatisfactory conditions have been corrected.
			2. INSTALLATION
				1. Install coils level and plumb.
				2. Install coils in metal ducts and casings constructed in accordance with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."
				3. Clean coils using materials and methods recommended in writing by manufacturers, and clean inside of casings and enclosures to remove dust and debris.
			3. ELECTRICAL CONNECTIONS
				1. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
				2. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
				3. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.
				4. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

Retain one of two subparagraphs below. First subparagraph cross-references Section 260553 "Identification for Electrical Systems" and should be retained for consistent electrical identification. Second subparagraph is an abbreviated version of the product specified in Section 260553 "Identification for Electrical Systems."

Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."

Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least **[1/2 inch] <Insert dimension>** high.

* + - 1. CONTROL CONNECTIONS
				1. Install control and electrical power wiring to field-mounted control devices.
				2. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."
				3. Install nameplate for each control connection, indicating field control panel designation and I/O control designation feeding connection.
			2. FIELD QUALITY CONTROL

Retain "Testing Agency," "Manufacturer's Field Service," and "Perform the following tests and inspections" paragraphs below to identify who shall perform tests and inspections. If retaining second option in "Testing Agency" paragraph or if retaining "Manufacturer's Field Service" or "Perform the following tests and inspections" paragraph, retain "Field quality-control reports" paragraph in "Informational Submittals" Article.

Retain "Manufacturer's Field Service" paragraph below to require a factory-authorized service representative to perform tests and inspections.

* + - * 1. Manufacturer's Field Service: Engage a Company Service Advisor to test and inspect components, assemblies, and equipment installations, including connections.

Retain "Perform tests and inspections" paragraph below to require Contractor to perform tests and inspections, and retain option to require Contractor to arrange for the assistance of a factory-authorized service agent.

* + - * 1. Perform tests and inspections**[ with the Company Service Advisor per OGS Spec Section 014216]**.
				2. Tests and Inspections:

Operational Test: After electrical circuitry has been energized, operate electric coils to confirm proper unit operation.

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

* + - * 1. Prepare test and inspection reports.

END OF SECTION 238216.14