**SECTION 23 73 12**

**AIR HANDLING UNIT COILS**

**BASED ON DFD MASTER SPECIFICATION DATED 2/24/2020**

***This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items or modify what is currently written. The Division of Facilities Development expects changes and comments from you.***

**P A R T 1 - G E N E R A L**

**SCOPE**

This section contains specifications for coils used in all central station air handling units and field erected air handling units, whether located indoors, or outdoors. Included are the following topics:

PART 1 - GENERAL

Scope

Related Work

Reference

Reference Standards

Quality Assurance

Submittals

Operation and Maintenance Data

Design Criteria

PART 2 - PRODUCTS

Manufacturers

Hot Water Coils

Steam Coils (Horizontal Tube Steam Distributing)

Steam Coils (Integral Face and Bypass)

Chilled Water Coils

Refrigerant Coils

PART 3 - EXECUTION

Hot Water Coils

Steam Coils (Horizontal Tube Steam Distributing)

Steam Coils (Integral Face and Bypass)

Chilled Water Coils

Refrigerant Coils

Construction Verification Items

Agency Training

**RELATED WORK**

Section 01 91 01 or 01 91 02 – Commissioning Process

Section 23 08 00 – Commissioning of HVAC

Section 23 73 13 - Modular Indoor Central-Station Air-Handling Units

Section 23 82 00 - Convection Heating and Cooling Units

**REFERENCE**

Applicable provisions of Division 1 govern work under this section.

**REFERENCE STANDARDS**

ARI 410 Forced Circulation Air-Cooling and Air-Heating Coils

**QUALITY ASSURANCE**

Refer to division 1, General Requirements, Equals and Substitutions

**SUBMITTALS**

Refer to division 1, General Requirements, Submittals.

Including data concerning dimensions, capacities, flow rate, pressure drop, materials of construction, ratings, weights, and appropriate identification at the same time that the air handling equipment in which the coils will be located are submitted.

# OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

***Delete the following if there are no additional requirements.***

In addition to the general content specified under GENERAL REQUIREMENTS supply the following additional documentation:

1. ***[A/E and commissioning provider to define detailed operation and maintenance data requirements for equipment specifications added to this section.]***

**DESIGN CRITERIA**

Select coil sizes, capacities, configuration, and operating characteristics as shown on the plans and/or as scheduled. Coil capacity ratings shall be ARI 410 certified.

***Consultants are reminded that ARI 410 has specific criteria relating to fouling factors and tube velocities which must be remembered when making the selections.***

**P A R T 2 - P R O D U C T S**

**MANUFACTURERS**

Aerofin, Carrier, McQuay, RAE Corporation, Trane, York, Marlo, Wing, Temtrol or Control Air.

**HOT WATER COILS**

Use galvanized steel casing, end supports, top channel, and bottom channel to produce a rigid frame with allowance for expansion and contraction of the finned tube section.

Construct coils of 0.025 inch tube wall seamless copper tubes of 5/8 inch maximum outside diameter with maximum of 8 aluminum fins per inch suitable for working pressures to 125 psig and temperatures to 250°F. Coil fins may be the continuous serpentine or plate fin type.

***The 0.025 inch tube wall may be increased to a maximum of 0.035 inch if the agency can establish evidence of corrosive water or a history of freezing conditions. The desired maximum fins is 8 fins per inch. If more than two rows are required to meet the needed heating capacity at 8 fins per inch, then the fins may be increase up to 12 fins per inch as needed to keep the rows at two maximum.***

Coil headers may be constructed of cast iron, steel, or seamless copper. Where cast iron headers are used, expand tubes into the headers. Where steel or copper headers are used braze tubes to header.

***Where dirty systems are encountered, use the specified coil headers but install a strainer upstream of the control valve serving each coil or coil bank.***

Provide coils with bronze spring turbulators where required to provide the capacities indicated.

**STEAM COILS (Horizontal Tube Steam Distributing)**

Use galvanized steel casing, end supports, top channel, and bottom channel to produce a rigid frame with allowance for expansion and contraction of the finned tube section.

Construct coils of 0.035 inch tube wall seamless copper tubes of 1 inch maximum outside diameter outer tube, 0.035 inch tube wall steam distributing seamless copper inner tube, and a maximum of 8 aluminum fins per inch, suitable for working pressures to 125 psig and temperatures to 250°F. Coil fins may be the continuous serpentine or plate fin type.

***The desired maximum fins is 8 fins per inch. If more than two rows are required to meet the needed heating capacity at 8 fins per inch, then the fins may be increase up to 12 fins per inch as needed to keep the rows at two maximum.***

Coil headers may be constructed of cast iron, steel, or seamless copper. Where cast iron headers are used, expand tubes into the headers. Where steel or copper headers are used braze tubes to header.

***Where dirty systems are encountered, use the specified coil headers but install a strainer upstream of the control valve serving each coil or coil bank.***

**STEAM COILS (Integral Face and Bypass)**

***Include both the DFDM top connection VIFB coil detail (Wing) and DFDM bottom connection VIFB steam coil detail (Aerofin) for all VIFB coil designs.***

Coils shall be vertical type, consisting of a series of finned heating elements and by-pass dampers. Dampers to be arranged to completely enclose and isolate the heating coil when no heating is required, open to the coil face upon loss of control air or actuator power, and have factory mounted [pneumatic actuators with pilot positioners] [electric, spring return, 0-10VDC control signal] and linkages. Volume of air passing through the coil shall not vary more than ± 5% regardless of the position of the internal dampers. Provide mixing baffles to help provide for mixing air at lower velocities due to fan turndown.

***Coordinate actuator requirements (pneumatic or electric) with section 23 09 14 OR 23 09 15 and sequence of operations.***

Finned heating elements to be fabricated of seamless, straight, vertical copper tubes with aluminum fins spaced not closer than 8 fins per inch. Each tube shall be individually secured to the steam and return headers by a brazed joint. Minimum tube wall thickness to be 0.035 inch.

***The desired maximum fins is 8 fins per inch. If more than two rows are required to meet the needed heating capacity at 8 fins per inch, then the fins may be increase up to 12 fins per inch as needed to keep the rows at two maximum.***

Coils over 67” wide shall be supplied with split steam and split condensate headers.

Coils to be suitable for working pressures to 200 psig and temperatures to 250°F.

**CHILLED WATER COILS**

Use galvanized steel casing, end supports, top channel, and bottom channel to produce a rigid frame with allowance for expansion and contraction of the finned tube section.

Construct coils of 0.025 inch tube wall seamless copper tubes of 5/8 inch maximum outside diameter with maximum of 8 aluminum fins suitable for working pressures to 200 psig. Coil fins may be the continuous serpentine or plate fin type.

***The 0.025 inch tube wall may be increased to a maximum of 0.035 inch if the agency can establish evidence of corrosive water or a history of freezing conditions. The desired maximum fins is 8 fins per inch. If more than eight rows are required to meet the needed cooling capacity at 8 fins per inch, then the fins may be increase up to 12 fins per inch as needed to keep the rows at eight maximum.***

Coil headers may be constructed of cast iron, steel, or seamless copper. Where cast iron headers are used, expand tubes into the headers. Where steel or copper headers are used braze tubes to header.

***Where dirty systems are encountered, use the specified coil headers but install a strainer upstream of the control valve serving each coil or coil bank.***

Coils shall be drainable type with drain and vent plugs for each header.

**REFRIGERANT COILS**

Use galvanized steel casing, end supports, top channel, and bottom channel to produce a rigid frame with allowance for expansion and contraction of the finned tube section.

Construct coils of minimum 1/2" outside diameter copper tubes with aluminum fins. Test at 250 psig, dehydrate, purge with inert gas, and seal prior to shipment.

Construct suction header of seamless copper tubing. Use a low pressure drop venturi type distributor to distribute refrigeration equally to multiple circuits.

Coil fins shall be the continuous serpentine or plate fin type.

**P A R T 3 - E X E C U T I O N**

**HOT WATER COILS**

Install in central station air handling unit casings or on structural support frames for field erected units, making allowance for pitching as recommended by the manufacturer. Mount coils in field erected units to allow for individual removal.

Comb bent or crushed fins after installation. Clean dust and debris from each coil to ensure its cleanliness.

Install a separate air vent and drain valve for each coil header in such a manner that the vent and drain valves are located outside of air handling unit casing. Provide offsets in piping to facilitate coil removal.

Unless otherwise specified, pipe coils for counter flow arrangement.

**STEAM COILS (Horizontal Tube Steam Distributing)**

Install in central station air handling unit casings or on structural support frames for field erected units, making allowance for pitching as recommended by the manufacturer. Comb bent or crushed fins after installation. Clean dust and debris from each coil to ensure its cleanliness.

Provide offsets in piping to facilitate coil removal.

Trap each coil individually. Pipe trap from coil outlet with sufficient vertical condensate head as detailed.

Provide vacuum breakers at coil inlet and outlet.

**STEAM COILS (Integral Face and Bypass)**

Install in air handling units on structural supports, making allowance for the required steam traps. Comb bent or crushed fins after installation. Clean dust and debris from each coil to ensure its cleanliness.

Provide offsets in piping to facilitate coil removal.

Trap each coil individually. Pipe trap from coil outlet with sufficient vertical condensate head as detailed.

Provide flexible pipe connection at coil bottom outlet as detailed to allow for piping movement from thermal expansion.

Provide vacuum breaker check valves at coil inlet and outlet.

**CHILLED WATER COILS**

Install in central station air handling unit casings or on structural support frames for field erected units, making allowance for pitching as recommended by the manufacturer. Mount coils in field erected units to allow individual removal.

Comb bent or crushed fins after installation. Clean dust and debris from each coil to ensure its cleanliness.

Install a separate air vent and drain valve for each coil header in such a manner that the vent and drain valves are located outside of air handling unit casing. Provide offsets in piping to facilitate coil removal. Unless otherwise specified, pipe coils for counter flow arrangement.

Where coils are installed in ductwork or field erected air handling units, provide a 1-1/2" deep 18 gauge welded stainless steel drain pan as an integral part of the duct or at coil support.

Install condensate drain trap with proper depth from each cooling coil condensate drain to the nearest drain location.

***Make sure there is sufficient depth below air handling unit cooling coils to obtain the proper depth of trap; spring vibration isolators or housekeeping pads will not provide sufficient height.***

**REFRIGERANT COILS**

Install in central station air handling unit casings or on structural support frames for field erected units, making allowance for pitching as recommended by the manufacturer. Mount coils in field erected units to allow for individual removal.

Comb bent or crushed fins after installation. Clean dust and debris from each coil to ensure its cleanliness.

Install refrigerant specialties as detailed and in accordance with manufacturer's instructions. Provide offsets in piping to facilitate coil removal.

Where coils are installed in ductwork or field erected air handling units, provide a 1-1/2" deep 18 gauge welded stainless steel drain pan as an integral part of the duct or at coil support.

Install condensate drain trap with proper depth from each cooling coil condensate drain to the nearest drain location.

Make sure there is sufficient depth below air handling unit cooling coils to obtain the proper depth of trap; spring vibration isolators or housekeeping pads will not provide sufficient height.

**CONSTRUCTION VERIFICATION**

Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

# AGENCY TRAINING

All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 01 91 01 or 01 91 02.

END OF SECTION