UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

SECTION 23 82 19.00 40

FAN COIL UNITS

05/17

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SECTION 23 82 19.00 40

FAN COIL UNITS
05/17

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NOTE: This guide specification covers the requirements for fan coil units for temperature-control assemblies.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).
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PART 1 GENERAL

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NOTE: If Section 23 30 00 HVAC AIR DISTRIBUTION is not included in the project specification, applicable requirements therefrom should be inserted and the following paragraph deleted. If Section 23 05 48.00 40 VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT is not included in the project specification, applicable requirements therefrom should be inserted and the second paragraph deleted. If Section 26 60 13.00 40 LOW-VOLTAGE MOTORS is not included in the project specification, applicable requirements therefrom should be inserted and the third paragraph deleted.
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[Section 23 30 00 HVAC AIR DISTRIBUTION applies to work specified in this section.

][Section 26 60 13.00 40 LOW-VOLTAGE MOTORS applies to this section.

]1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.
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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACOUSTICAL SOCIETY OF AMERICA (ASA)

ASA S12.23	(1989; R 2016) Method for the Designation of Sound Power Emitted by Machinery and Equipment

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)

AHRI 440	(2008) Performance Rating of Room Fan-Coils

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 1940-1	(2003; R 2008) Mechanical Vibration - Balance Quality Requirements for Rotors in a Constant (Rigid) State - Part 1: Specification and Verification of Balance Tolerances

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA MG 1	(2018) Motors and Generators

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 90A	(2021) Standard for the Installation of Air Conditioning and Ventilating Systems

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-810	(2019; Rev H) Environmental Engineering Considerations and Laboratory Tests

UNDERWRITERS LABORATORIES (UL)

UL 1995	(2015) UL Standard for Safety Heating and Cooling Equipment
UL Bld Mat Dir	(updated continuously online) Building Materials Directory

1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication Drawings; G[, [____]]

Installation Drawings; G[, [____]]

SD-03 Product Data

Equipment and Performance Data; G[, [____]]

Coils; G[, [____]]

Casing; G[, [____]]

Enclosure; G[, [____]]

Motors; G[, [____]]

Fan; G[, [____]]

Drain Pans; G[, [____]]

Filters; G[, [____]]

Controls; G[, [____]]

Vibration Isolation; G[, [____]]

SD-04 Samples

Manufacturer's Standard Color Chart; G[, [____]]

SD-07 Certificates

List of Product Installations

Certificates of Conformance

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

SD-11 Closeout Submittals

Warranty

1.3 QUALITY ASSURANCE

Submit a list of product installations for fan coil units showing a minimum of five installed units, similar to those proposed for use, that have been in successful service for a minimum of 5 years. Include the name of the purchaser, address of installation, name of service organization, and date of installation.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

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NOTE: Specify fan and motor balance conforms to ISO Std. 1940/1 - (2003) Balance Quality Requirements for Rotors in a Constant(Rigid) State unless otherwise noted. Specify motor vibration levels conform to NEMA Specification MG-1, Motors and Generators, Part 7 unless otherwise noted.

When possible the use of sealed bearings is encouraged. One of the major causes of bearing failures is overlubrication and lubrication contamination. Using sealed bearings helps to eliminate this failure mode.

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[Include an enclosure for cabinet models and a casing for concealed models.

] Provide a base unit complete with galvanized casing, a water coil assembly with an auxiliary water or steam heating-coil, valve and piping package, drain pans, air filter, fan motor, and motor control. Ensure that the sound power level, as measured in decibels at 10 to the minus 12 watt at the fan operating speed selected to meet the specified capacity, does not exceed the following values at the midfrequency of each octave band:

OCTAVE BANDS					
	3rd	4th	5th	6th	7th
Frequency (hertz)	250	500	1,000	2,000	4,000
Power Level (decibels)	60	55	53	50	48

Obtain values for sound power level for these units in accordance with the test procedures specified in ASA S12.23. Sound power values apply to units provided with factory-fabricated cabinet enclosures and standard grilles. Values obtained for the standard cabinet models are acceptable for concealed models without the need for separate tests, provided there is no variation between models as to the coil configuration, blowers, motor speeds, and relative arrangement of parts. Fasten each unit securely to the building structure. Ensure that the capacity of the units is as indicated. Ensure that room fan coil units are certified as complying with AHRI 440 and meet the requirements of UL 1995.

2.2 COMPONENTS

Provide a list of material and equipment including the manufacturer's style or catalog numbers, specification and drawing reference numbers, and warranty information.

Submit fabrication drawings for fan coil units including the fabrication and assembly details performed in the factory.

Submit equipment and performance data for fan coil units including information on the service life, system functional flows, safety features, and mechanical automated details. Also submit curves indicating that the equipment response and performance characteristics, including vibration isolation have been tested and certified. Submit certificates of conformance for the following:

a. Enclosure

b. Casing

c. Fan

d. Coils

e. Drain Pans

f. Filters

g. Motors

h. Controls

Submit product data for vibration isolation components.

Submit the manufacturer's standard color chart, indicating the manufacturer's standard color selections and finishes for fan coil units.

2.2.1 Enclosure

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NOTE: Supplement the following when exposed-to-view surfaces are an architectural feature.
****

Construct an enclosure of 1.3 millimeter 18-gage or heavier steel, properly reinforced and braced. Ensure that the front panel of the enclosure is removable. Ensure that discharge louvers are four-way adjustable and are designed to properly distribute air throughout the conditioned space. Ensure that ferrous surfaces are galvanized or treated with a rust-inhibiting finish. Ensure that exposed enclosure corners and edges are rounded. Ensure that discharge louvers are mounted in a top panel that can be removed to allow for coil cleaning. Ensure that access doors are hinged and provided for all piping and control compartments. Ensure that the finish is in the manufacturer's standard color, as selected by the Contracting Officer.

2.2.2 Casing

Ensure that the interior of the casing is acoustically and thermally insulated with insulation that is not less than 13 millimeter 1/2-inch thick, that conforms to NFPA 90A, and that is fastened with waterproof and fire-resistant adhesive.

2.2.3 Fan

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NOTE: Evaluate necessity for reference to MIL-STD-810.
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Provide a centrifugal fan made of galvanized steel or aluminum, with [_____] blades. In lieu of metal, fabricate or mold the wheels and scrolls from reinforced nonmetallic compounds certified to have passed the low-temperature, high-temperature, temperature-shock, and sand and dust tests for ground equipment, as outlined in MIL-STD-810. Ensure that the

fan passes tests without showing characteristics that indicate deformation, cracking, corrosion, or loss of balance. Ensure that surfaces are smooth, that assemblies are accessible for maintenance, and that disassembly and reassembly are done by mechanical fastening devices, not adhesives. After the fan is assembled in the unit, ensure that the fan was dynamically and statically balanced to ISO 1940-1 standards at the factory.

2.2.4 Coils

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NOTE: Indicated and provide two-way, three-way, or four-way control valves under Section 23 09 33.00 40 ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC, coordinate with unit description.
****

Ensure that the water coil was constructed with not less than 13 mm 1/2-inch outside diameter (OD) seamless copper tubing with copper or aluminum plate fins mechanically bonded or soldered to the tubes. Ensure that the coil construction includes at least 16 mm 5/8-inch OD female solder connectors, an accessory piping package with terminal connections for control valves, and manual air vents on returns. Make provisions for coil removal.

2.2.5 Drain Pans

Size and locate drain pans to collect condensed water dripping from any item within the unit enclosure. Do not construct drain pans of [galvanized steel] [stainless steel] [plastic] [_____] that is lighter than 1 millimeter 20-gage and thermally insulated to prevent condensation. Coat the thermal insulation with a waterproofing compound. Provide a copper drain connection in the drain pan that is no less than M20, (ISO) 3/4-inch National Pipe Thread (NPT) or 16 mm 5/8-inch OD. Ensure that the drain pan slopes not less than 3 millimeter per 300 millimeter 1/8-inch per foot to the drain.

2.2.6 Filters

For each unit, provide filters that are glass fiber throwaway or permanent and washable, with a 25 millimeter 1 inch nominal thickness, in conformance with UL Bld Mat Dir. Ensure that filters can be removed without tools.

2.2.7 Motors

Provide permanent split-capacitor motors that are direct connected, two-bearing, and built-in overload protection, and that conform to NEMA MG 1. Mount motors on a resilient base. Furnish motors with three built-in speeds and with four insulated leads (common, high, medium, and low) that terminate in a control-junction box.

When specified, provide a solid-state variable speed controller capable of not less than 50 percent speed reduction in lieu of step speed control.

2.2.8 Controls

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NOTE: Coordinate with Section 23 09 33.00 40

ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC.
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Ensure that applicable requirements of Section 23 09 33.00 40 ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC .

] Provide a unit with factory-installed control valves furnished by the automatic temperature-control manufacturer.

Ensure that the motor speed-control switch provides for speed selection, has an off position, and is mounted for convenient use from an access door.

PART 3 EXECUTION

3.1 INSTALLATION

Install equipment in accordance with the manufacturer's recommendations. Set the dampers in a fixed position to provide outside air in the quantity scheduled.

Submit installation drawings for fan coil systems in accordance with referenced standards in this section.

Contain thermal and acoustical insulation within a double-walled enclosure or seal the insulation with a moistureproof coating impervious.

Install the controls in a unit-mounted control panel. Provide remote-mounted controllers where indicated.

3.2 FIELD QUALITY CONTROL

Hydrostatically the test coils at 1750 kilopascal 250 pounds per square inch (psi) or under water at 1750 kilopascal 250 psi air pressure. Ensure that the coils are suitable for 1400 kilopascal 200 psi working pressure.

3.3 CLOSEOUT ACTIVITIES

Submit [six] [_____] copies of the operation and maintenance manuals at least 30 calendar days before the fan coil units are tested. Update and resubmit data for final approval no later than 30 calendar days before contract completion.

Submit the manufacturer's standard warranty to the Contracting Officer.

-- End of Section --