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 43.00 40

ELECTRIC DUCT HEATERS

05/17

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USACE / NAVFAC / AFCEC / NASA | **UFGS-23 82 43.00 40 (May 2017)**

Preparing Activity: NASA | **Superseding UFGS-23 82 43.00 40 (August 2014)**

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SECTION 23 82 43.00 40

ELECTRIC DUCT HEATERS
05/17

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NOTE: This guide specification covers the requirements for electric duct heaters. Indicate on the drawings capacity, voltage, rating, control-circuit voltage, heating stages, cfm, sizes, and other pertinent data.

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

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.

UNDERWRITERS LABORATORIES (UL)

UL 1996	(2009; Reprint Aug 2020) UL Standard for Safety Electric Duct Heaters

1.2 ADMINISTRATIVE REQUIREMENTS

1.2.1 Preinstallation Meetings

The Contracting Officer will schedule a preinstallation meeting within [30][_____] days of Contract Award. Provide the following for review and approval:

a. Submit fabrication drawings for duct heaters, consisting of fabrication and assembly details to be performed in the factory.

b. Submit manufacturer's instructions for duct heaters, including installation drawings showing any special provisions required to install equipment components and system packages. Clearly note impedances, hazards and safety precautions.

1.3 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

Installation Drawings; G[, [____]]

SD-03 Product Data

Performance Data; G[, [____]]

Duct Heaters; G[, [____]]

Heating Elements; G[, [____]]

Enclosures; G[, [____]]

Controls; G[, [____]]

SD-08 Manufacturer's Instructions

Manufacturer's Instructions

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide duct heaters with the capacity indicated, plus or minus 5 percent. Ensure that duct heaters are factory-prewired and ready for field terminal connections.

Ensure that duct heaters conform to the requirements of UL 1996.

[Base capacity on [_____] [16] degrees C [60] degrees F entering air and [_____][30] degrees C [85]-degree F discharge air at [_____][8.5] cubic meter [300] cubic feet per minute.

]2.1.1 Performance Requirements

Submit performance data for duct heaters, including use life, system

functional flows, safety features, and mechanical automated details.

2.2 COMPONENTS

2.2.1 Heating Elements and Enclosures

Install heating elements with a framework complete with terminal, and construct junction boxes of mill-aluminized or galvanized carbon steel. Provide with a magnetic contactor in a separate enclosure insulated from the duct at the duct heater location or at a separate, remote location.

Ensure that all gasketing is 1.6 millimeter 1/16-inch thick, nonasbestos woven-cloth tape, with a flange depth suitable for the duct insulation provided. Insulate the terminal junction box to prevent elevated temperatures.

[Provide a sheathed heating element consisting of a resistance wire insulated by highly compacted refractory insulation protected by a sealed metallic-finned sheath. Provide component materials as follows:

a. Resistance wire - helix-wound alloy approximately 80 percent nickel and 20 percent chromium.

b. Refractory insulation - magnesium oxide. Subject the element to a dielectric test of twice the element rated voltage plus 1,000 volts applied between the terminal and the sheath for a period of 1 minute.

c. Sheathing - aluminum fins cast around an internal steel sheath containing refractory insulation and resistance wire or carbon-steel fins permanently attached to a tubular carbon-steel or corrosion-resistant steel sheath containing refractory insulation and resistance wire and with all external surfaces porcelainized.

d. Wattage density cannot exceed 90 watts per 25 linear millimeter linear inch of heated element length or not greater than 22 watts per 645 square millimeter square inch.

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NOTE: Do not specify an open heating element when it will be exposed to salt air.

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[Provide an open heating element consisting of a helix-wound resistance wire alloy approximately 80 percent nickel and 20 percent chromium. Wattage density is not to exceed 50 watts per 25 linear millimeter linear inch of heated element. Ensure that the element support minimizes abrasion and sagging. Provide safety screens on both the upstream and downstream sides of the heater elements.

Provide dummy elements or include other provisions similar to open-area perforated screens if required to uniformly distribute airflow across the heater face.

]2.2.2 Controls

Provide units with integral overheat cutouts for primary and secondary protection, with a disk-type automatic-reset primary cutouts suitable for 277-volt, 60-hertz service.

[Provide a disk-type manual-reset secondary cutouts wired in series with each circuit.

][Provide bulb-type manual-reset secondary cutouts that actuate integral magnetic backup contactors.

][Provide bulb-type manual-reset secondary cutouts that de-energize each circuit directly.

] Provide indicating lights to show:

a. Heater on

b. Each circuit on

[Locally provide a pilot switch to cut off the heater through integral magnetic contactors.

] For heater assemblies rated at 45 amperes and larger, provide a heater assembly that is subdivided and fused. Fuse each subdivided 45-ampere heater load section. In circuits of less than 45 amperes, fuse appropriate sections.

Provide UL-approved magnetic contactors, (other than integral overheat-cutout associated units), and remotely locate as indicated.

[Provide step controllers for sequencing heater loads of UL-approved components, and include the following:

a. A delay to prevent line surge when energizing loads

b. Individual fusing of each step

c. Intercomponent wiring to terminals for a field connection cabinet

][Provide [single-] [two-] [three-] stage, wall-mounted thermostats.

][Provide thermostats complete with thermometer, mechanical high-limit stop, calibrated operator, and an adjustable heater to prevent override of space temperature. Ensure that the range is between 13 and 40 degrees C 55 and 105 degrees F, with differential not to exceed 1 degrees C 1.5 degrees F, rated for operation at 24 volts, 60 hertz. Provide any necessary transformers, wiring, and devices to meet this requirement. Finish cases in brushed or satin chrome.
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NOTE: Supplement the following paragraph if solid-state step controller is selected.

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[Provide control of power to the unit by a UL-listed solid-state silicon-controlled rectifier (SCR) system such that voltage is continuously impressed and varied in minute increments over a range of zero to [the rated voltage] [105 percent of the rated voltage].

]PART 3 EXECUTION

3.1 INSTALLATION

Install duct heaters in accordance with the manufacturer's instructions, and locate duct heaters to permit access to the heater after installation.

[Install [status point][temperature probe] routed to the building controller to indicate when the unit is in heating mode.

][For duct heaters inside a VAV, display the fan status at the building controller.

]3.2 FIELD QUALITY CONTROL

Demonstrate that duct heaters operate satisfactorily in the presence of the Contracting Officer.

Conduct an operational test for a minimum of [6] [_____] hours.

Cycle duct heaters five times, from start to operating thermal conditions to off, to verify adequacy of construction, system controls, and component performance.

-- End of Section --