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USACE / NAVFAC / AFCEC / NASA **UFGS-23 83 00.00 20 (April 2006)**

Preparing Activity: NAVFAC **Replacing without change UFGS-15768N (September 1999)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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SECTION TABLE OF CONTENTS

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

SECTION 23 83 00.00 20

ELECTRIC SPACE HEATING EQUIPMENT

04/06

PART 1 GENERAL

1.1 REFERENCES
1.2 GENERAL REQUIREMENTS
1.3 SUBMITTALS

PART 2 PRODUCTS

2.1 ELECTRIC [UNIT] [AND] [CABINET] HEATERS
2.1.1 Enclosure
2.1.2 Heating Element
2.1.3 Controls
2.1.4 Wiring
2.1.5 Accessories
2.1.6 Thermostat
2.1.7 Disconnect Means
2.1.8 Outdoor Sensor
2.2 ELECTRIC [BASEBOARD] [SILL] [PEDESTAL] UNITS
2.2.1 Enclosure
2.2.2 Accessories
2.2.3 Limit Control
2.2.4 Disconnect Means
2.2.5 Unit Thermostat
2.2.6 [Outdoor Sensor
2.3 ELECTRIC INFRARED HEATER
2.4 INFRARED HEATER THERMOSTAT
2.5 CONTACTORS
2.6 DISCONNECTS

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Unit Heaters
3.1.2 Cabinet Heaters
3.1.3 Remote Thermostat
3.1.4 [Baseboard] [Sill] [Pedestal] Heaters

3.1.5 Electric Infrared Heaters
3.2 FIELD QUALITY CONTROL
3.2.1 Field Inspection
3.2.2 Insulation Resistance Tests
3.2.3 Operational Tests

-- End of Section Table of Contents --

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SECTION 23 83 00.00 20

ELECTRIC SPACE HEATING EQUIPMENT
04/06

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NOTE: This guide specification covers the requirements for electric space heating equipment for construction projects.

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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NOTE: Include a schedule of heaters on the drawings. Information, as indicated in Appendix A, should be included in the schedules. The following generic terms should be used in the specifications and drawings to ensure consistent terminology.

1. Unit heater. A self-contained heating unit, usually suspended from ceiling or structure, with fan and heating elements. Electric unit heaters are also specified in Section 23 82 00.00 20 TERMINAL HEATING UNITS. If that section is included in the specifications, do not include electric unit heaters in this section.

2. Cabinet heater. A unit consisting of a heating element and a fan, in an enclosure designed for recessed or surface mounting, to provide circulation of heated air for general heating. Cabinet heaters

are generally fan-coil units without cooling provisions. Fan coil units are specified in Section 23 30 00 HVAC AIR DISTRIBUTION. If that section is included in the specifications, do not include cabinet heaters in this section.

3. Baseboard heater. A unit consisting of an enclosed heating element, designed for wall mounting near the intersection of the wall and floor. Also known as a convection heater. Intended for general heating or a draft barrier.

4. Sill heater. A unit similar to a baseboard unit but intended for wall mounting below window sills and other heights above the intersection of the wall and floor.

5. Pedestal heater. A unit similar to a baseboard heater but intended for floor mounting on short pedestals near but separated from the wall.

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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.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA DC 3	(2013) Residential Controls - Electrical Wall-Mounted Room Thermostats
NEMA ICS 2	(2000; R 2005; Errata 2008) Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated 600 V

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1025	(1980; R 1990, Bul. 1991) Electric Air Heaters
UL 1042	(2009; Reprint Dec 2016) UL Standard for Safety Electric Baseboard Heating Equipment

1.2 GENERAL REQUIREMENTS

Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM, applies to this section, with the additions and modifications specified herein.

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

Heater installation drawing

SD-03 Product Data

Electric [unit] [and] [cabinet] heaters

Electric [baseboard] [sill] [pedestal] units

[Electric infrared heater]

Thermostat

Unit thermostat

[Infrared heater thermostat]

SD-10 Operation and Maintenance Data

Electric [unit] [and] [cabinet] heaters, Data Package 5

Electric [baseboard] [sill] [pedestal] units, Data Package 5

[Electric infrared heater, Data Package 5]

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

PART 2 PRODUCTS

2.1 ELECTRIC [UNIT] [AND] [CABINET] HEATERS

UL 1025; wattage, voltage, phase, number of steps, watts Btu/hrand cubic meter per second CFM as indicated. Provide control-circuit terminals and single source of power supply. Heaters 5 Kw and larger shall be 3-phase, with load balanced on each of the three phases. Limit leaving air temperature to 60 degrees C 140 degrees F with entering air of 15 degrees C 60 degrees F.

2.1.1 [Enclosure

****

NOTE: UL 1025 provides enclosure construction requirements that are adequate for installation in ordinary locations. Use this paragraph for heaters to be located in areas where the heater may be subject to abuse.

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Minimum [20] [_____] gage steel.

]2.1.2 Heating Element

Nickel chromium heating wire element, free from expansion noise and 60 Hz hum. Embed element in magnesium-oxide insulating refractory. Seal element in high-mass steel or corrosion-resisting metallic sheath with fins. Enclose element ends in terminal box. Provide not more than six fins per 25 mm inch. Limit fin surface temperature 285 degrees C 550 degrees F at any point during normal operation.

2.1.3 Controls

Include limit controls for overheat protection of heaters. For remote thermostatic operation, provide contactor rated for 100,000 duty cycles. [Provide a control transformer to supply 120-volt thermostat control circuit for each heater.]

2.1.4 Wiring

Completely factory-prewired to terminal strips, ready to receive branch circuit and control connections for 60 degrees C 140 degrees F[copper] [or] [aluminum] wiring.

2.1.5 [Accessories

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NOTE: These accessories are not integral components of electric unit heater. Delete this paragraph if not required.
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Provide fan switching devices to independently operate the fan motor for summer ventilation and winter heat recovery.

]2.1.6 Thermostat

****
NOTE: Choose integral or space thermostat, except for restroom facilities and bathrooms, modify paragraph to provide timer control with maximum time setting of 30 minutes.
****

Provide tamper resistant [integral] [space] thermostat, adjustable without requiring removal of heater components. Thermostat operating range shall be approximately 10 degrees C 50 degrees F to a maximum of [24] [_____] degrees C [75] [_____] degrees F with operating differential of 0.5 degrees C 3 degrees F or less.

2.1.7 Disconnect Means

Provide factory-installed safety disconnect switch [in the housing or in an auxiliary matching control section] [in combination with thermostat] with "off" position marking on the face plate.

2.1.8 [Outdoor Sensor

Provide outdoor sensor with sunlight-and-rain protection shield. The sensor shall provide a positive heater shut off when outdoor air temperature is 18 degrees C 65 degrees F or higher.

]2.2 ELECTRIC [BASEBOARD] [SILL] [PEDESTAL] UNITS

UL 1042; wattage, voltage, phase, heat in watts Btu per houroutput indicated. Provide units complete with heating elements, mounting brackets, end closures, splice plates, interior and exterior corners and accessible wiring compartment. Limit outlet air temperature and enclosure surfaces to 93 degrees C 200 degrees F under continuous operating conditions.

2.2.1 Enclosure

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NOTE: UL 1042 provides enclosure construction requirements that are adequate for installation in ordinary locations. Select heavier gage materials for units which may be subject to abuse.
****

Fabricate from [steel] [or] [aluminum] [not less than [18] [_____] gage.] Provide [galvanized] [factory applied rust-inhibiting paint] [factory primed for field painting] [manufacturer's standard] [_____] finish. Locate terminal blocks for branch circuit conductor [and control wiring] connections from the [bottom] [rear] [[right] or [left] side] [as required.] Wiring shall conform to NFPA 70.

2.2.2 Accessories

Where continuous wall-to-wall installations are indicated, provide accessories; including corner fittings, fillers, splice plates, and end caps. Accessories shall have the same profile as the basic unit, and contain no sharp edges. [Provide for expansion of enclosure.]

2.2.3 Limit Control

Provide thermal overload and over voltage protection.

2.2.4 Disconnect Means

Provide factory-installed safety disconnect switch [in the housing or in an auxiliary matching control section] [in combination with thermostat] with "off" position marking on the face plate.

2.2.5 Unit Thermostat

****
NOTE: Choose integral or space thermostat, except for restroom facilities and bathrooms, modify paragraph to provide timer control with maximum time setting of 30 minutes.
****

Provide tamper resistant [integral] [space] tool adjustable thermostat, without requiring removal of cabinet parts. Thermostat, operating range shall be approximately 10 degrees C 50 degrees F to a maximum of [24] [_____] degrees C [75] [_____] degrees F with operating differential of 0.5 degrees C 3 degrees F or less.

2.2.6 [Outdoor Sensor

Provide outdoor sensor with sunlight-and-rain protection shield. The sensor shall provide a positive heater shut off when outdoor air temperature is 18 degrees C 65 degrees F or higher.]

2.3 [ELECTRIC INFRARED HEATER

Comply with Section 23 82 00.00 20 TERMINAL HEATING UNITS.

]2.4 [INFRARED HEATER THERMOSTAT

NEMA DC 3.

]2.5 [CONTACTORS

NEMA ICS 2, Enclosure Type [1] [_____].

]2.6 [DISCONNECTS

****
NOTE: Include this paragraph for installation where a separate disconnecting means is required by NFPA 70, Article 424 Part C, "Control and Protection of Fixed Electric Space Heating Equipment."
****

Disconnect. UL listed. [Enclosed [fused] [non-fusible] switch, rated [_____] volt, [_____] phase, [_____] wire, NEMA Type [1] [3R] enclosure.] [Enclosed molded case circuit breaker, rated [_____] ampere, [_____] volt, [_____] poles, NEMA Type [1] [3R] enclosure.] [Disconnect shall be capable of being locked in the open position.]

]PART 3 EXECUTION

3.1 INSTALLATION

Install in conformance with the approved heater installation drawing, NFPA 70, UL listing, and manufacturer's instructions, with necessary clearances for air circulation, maintenance, inspection, service testing and repair. Connect to electrical supply in accordance with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

3.1.1 Unit Heaters

Mount units plumb, square and level with ceiling and walls.

3.1.2 Cabinet Heaters

Where recessed mounting is indicated, seal entire recessed opening from exterior wall cavities, and provide a minimum 15 mm 1/2-inch thick rigid fire resistant insulation on the wall behind the cabinet. [Verify manufacturer's clearance requirements from electrical cords, drapes, and other furnishings.]

3.1.3 Remote Thermostat

Mount remote room space thermostats [1375 mm 4 feet 6 inches above finished floor on wall] [or as indicated]. [Connect remote thermostats

with conduit and wiring to heaters as indicated.]

3.1.4 [[Baseboard] [Sill] [Pedestal] Heaters

Verify manufacturer's clearance requirements from electrical cords, drapes, and other furnishings.

]3.1.5 [Electric Infrared Heaters

Comply with Section 23 82 00.00 20 TERMINAL HEATING UNITS.

]3.2 FIELD QUALITY CONTROL

Provide necessary personnel, instruments, and equipment to perform tests. Notify the Contracting Officer [5] [_____] working days prior to scheduled testings and locations.

3.2.1 Field Inspection

Prior to initial operation, inspect installed equipment for conformance with drawings and specifications.

3.2.2 Insulation Resistance Tests

Test 600-volt wiring to verify that no short circuits or grounds exist. Tests shall be made using an instrument which applies a voltage of approximately 500 volts and provides a direct reading of resistance in ohms.

3.2.3 Operational Tests

Test equipment circuits and devices to demonstrate proper operation.Test each item of control equipment not less than 5 times.

APPENDIX A								
DESIGN INFORMATION: ELECTRIC UNIT AND CABINET HEATER								
Unit No.	**KW**	**Volts**	**Phase**	**No. of Steps**	**Watts Btu/hr**	**Cubic Meter Per Second CFM Air**	**Mounting Heights**	**Remarks**
ELECTRIC BASEBOARD, SILL AND PEDESTAL HEATERS								
Unit No.	**KW**	**Volts**	**Phase**		**Watts Btu/hr Output**		**Remarks**	
ELECTRIC INFRARED RADIANT HEATERS								
Type Letter	**Watts**	**Volts**	**No. of Elements Per Fixture**		**Beam Spread**	**Fixture**	**Mounting**	**Remarks**

-- End of Section --