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USACE / NAVFAC / AFCEA UFGS-15768N (September 1999)

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Preparing Activity: NAVFAC Replacing without revision  
NFGS of same number and date

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 22 December 2004

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09/99

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### SECTION 15768N

#### ELECTRIC SPACE HEATING EQUIPMENT 09/99

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

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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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 15760N TERMINAL HEATING AND COOLING 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

15720N AIR HANDLING UNITS. 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: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of SpecsIntact automated reference checking is recommended for projects based on older guide specifications.

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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 (2003) Residential Controls - Electrical Wall-Mounted Room Thermostats

NEMA ICS 2 (2000) Industrial Controls and Systems: Controllers, Contactors, and Overload Relays Rated Not More than 2000 Volts AC or 750 Volts DC

#### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2005) National Electrical Code

#### UNDERWRITERS LABORATORIES (UL)

UL 1025 (1980; R 1990, Bul. 1991) Electric Air Heaters

UL 1042 (1994; Rev Mar 2004) Electric Baseboard Heating Equipment

## 1.2 GENERAL REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS, applies to this section, with the additions and modifications specified herein.

## 1.3 SUBMITTALS

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NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation 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 projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01330 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 01781 OPERATION AND  
MAINTENANCE DATA.

## PART 2 PRODUCTS

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

UL 1025; wattage, voltage, phase, number of steps, watts Btu/hr and 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

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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

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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.  
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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  
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for units which may be subject to abuse.

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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

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**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.**

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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 15760N TERMINAL HEATING AND COOLING UNITS.

#### ] [2.4 INFRARED HEATER THERMOSTAT

NEMA DC 3.

#### ] [2.5 CONTACTORS

NEMA ICS 2, Enclosure Type [1] [\_\_\_\_\_] .



] 2.6 DISCONNECTS

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**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."**  
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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 16402 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 mm4 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 15760N TERMINAL HEATING AND COOLING 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 Outputs	Cubic Meter Per Second Air	Mounting Height	Remarks
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Unit No.	KW	Volts	Phase	No. of Steps	Btu/hr Output	CFM Air	Mounting Heights	Remarks
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### ELECTRIC BASEBOARD, SILL AND PEDESTAL HEATERS

Unit No.	KW	Volts	Phase	Watts	Btu/hr Output	Remarks
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### ELECTRIC INFRARED RADIANT HEATERS

Type Letter	Watts	Volts	No. of Elements Per Fixture	Beam Spread	Fixture	Mounting	Remarks
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-- End of Section --