

**SECTION 23 82 39  
UNIT HEATERS**

SPEC WRITER NOTES:

1. Use this section only for NCA projects.
2. Delete between // // if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs.
3. The spec writer shall review the Physical Security Design Manual for VA Facilities to determine and include any Life Safety requirements called out.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Cabinet unit heaters with centrifugal fans and electric-resistance heating coils.
- B. Propeller unit heaters with electric-resistance heating coils.
- C. Wall and ceiling heaters with propeller fans and electric-resistance heating coils.
- D. A complete listing of common acronyms and abbreviations are included in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

**1.2 RELATED WORK**

SPEC WRITER NOTE: Retain one of two paragraphs below.

- A. //Section 01 00 01, GENERAL REQUIREMENTS (Major NCA Projects).//
- B. //Section 01 00 02, GENERAL REQUIREMENTS (Minor NCA Projects).//
- C. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- D. Section 01 42 19, REFERENCE STANDARDS.
- E. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS.
- F. //Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.//

SPEC WRITER NOTE: If Section 13 05 41 is included in this project the section shall be obtained from VA Masters.

- G. //Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.//
- H. Section 23 05 11, COMMON WORK RESULTS FOR HVAC: General mechanical requirements and items which are common to more than one section of Division 23.
- I. Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC EQUIPMENT.

- J. //Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.//
- K. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).
- L. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

**1.3 APPLICABLE PUBLICATIONS**

SPEC WRITER NOTE: Make material requirements agree with requirements specified in the referenced Applicable Publications. Verify and update the publication list to that which applies to the project, unless the reference applies to all mechanical systems. Publications that apply to all mechanical systems may not be specifically referenced in the body of the specification, but, shall form a part of this specification.

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. National Fire Protection Association (NFPA):
  - 70-2014.....National Electrical Code (NEC)
  - 90A-2015.....Standard for the Installation of Air-Conditioning and Ventilating Systems
- C. Underwriters Laboratories (UL):
  - 499-2014.....Electric Heating Appliances

**1.4 SUBMITTALS**

- A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 23 82 39, UNIT HEATERS", with applicable paragraph identification.
- C. Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.
- D. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated.

- E. Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replacement parts, and troubleshooting guide:
  1. Include complete list indicating all components of the systems.
  2. Include complete diagrams of the internal wiring for each item of equipment.
  3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.
- F. //Completed System Readiness Checklist provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.//
- G. //Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.//

#### **1.5 QUALITY ASSURANCE**

- A. Refer to paragraph QUALITY ASSURANCE, in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

#### **1.6 AS-BUILT DOCUMENTATION**

SPEC WRITER NOTE: Coordinate O&M Manual requirements with Section 01 00 01, GENERAL REQUIREMENTS (Major NCA Projects) or Section 01 00 02, GENERAL REQUIREMENTS (Minor NCA Projects). O&M manuals shall be submitted for content review as part of the close-out documents.

- A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
- B. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be //in electronic version on CD or DVD// inserted into a three ring binder. All aspects of system operation and maintenance procedures, including applicable piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished. Information explaining any special knowledge or tools the

owner will be required to employ shall be inserted into the As-Built documentation.

- C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the time of final systems certification testing. As-built drawings are to be provided, and a copy of them in Auto-CAD version //\_\_\_\_// provided on CD or DVD. Should the installing contractor engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement.
- D. Certification documentation shall be provided to COR 10 working days prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and certification that all results of tests were within limits specified.

## **PART 2 - PRODUCTS**

### **2.1 CABINET UNIT HEATERS**

- A. Description: Factory-packaged units constructed according to UL 499.
- B. Cabinet: Steel with baked-enamel finish in color selected by Architect.
  - 1. Vertical Unit, Exposed Front Panels: Minimum 1.35 mm (0.053 inch) thick, sheet steel, removable panels with channel-formed edges secured with tamperproof cam fasteners.
  - 2. Horizontal Unit, Exposed Bottom Panels: Minimum 1.35 mm (0.053 inch) sheet steel, removable panels secured with tamperproof cam fasteners and safety chain.
  - 3. Recessing Flanges: Steel, finished to match cabinet.
  - 4. Control Access Door: Key operated.
  - 5. Base: Minimum 1.35 mm (0.053 inch) thick steel, finished to match cabinet, 100 mm (4 inches) high with leveling bolts.
- C. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and hum, mounted in ceramic inserts in a galvanized steel housing; with fuses in terminal box for overcurrent protection and limit controls for high-temperature protection. Terminate elements in stainless steel machine-staked terminals secured with stainless steel hardware.

- D. Fan and Motor Board: Removable.
  - 1. Fan: Forward curved, double width, centrifugal; directly connected to motor. Thermoplastic or painted steel wheels, and aluminum, painted steel, or galvanized steel fan scrolls.
  - 2. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board. Comply with requirements in Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC EQUIPMENT.
  - 3. Wiring Terminations: Connect motor to chassis wiring with plug connection.
- E. Basic Unit Controls:
  - 1. Control voltage transformer.
  - 2. //Wall-mounted// //Unit-mounted// thermostat.

## 2.2 PROPELLER UNIT HEATERS

- A. Description: Factory-packaged units constructed according to UL 499. An assembly including casing, coil, fan, and motor in //vertical// //horizontal// discharge configuration with adjustable discharge louvers.
- B. Cabinet: Removable panels for maintenance access to controls.
- C. Cabinet Finish: Manufacturer's standard baked enamel applied to factory-assembled and factory-tested propeller unit heater before shipping.
- D. Discharge Louver: Adjustable fin diffuser for horizontal units and conical diffuser for vertical units.
- E. Electric-Resistance Heating Elements: Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in steel or corrosion-resistant metallic sheath with fins no closer than 4 mm (0.16 inch). Element ends shall be enclosed in terminal box. Fin surface temperature shall not exceed 288 degrees C (550 degrees F) at any point during normal operation.
  - 1. Circuit Protection: One-time fuses in terminal box for overcurrent protection and limit controls for high-temperature protection of heaters.
  - 2. Wiring Terminations: Stainless steel or corrosion-resistant material.
- F. Fan: Propeller type with aluminum wheel directly mounted on motor shaft in the fan venturi.

- G. Fan Motors: Comply with requirements in Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC EQUIPMENT. Permanently lubricated, //explosion proof// //multispeed// //variable speed//.
- H. Control Devices:
  - 1. //Unit-mounted// //Wall-mounted//, //variable// fan-speed switch.
  - 2. //Unit-mounted// //Wall-mounted// thermostat.

### 2.3 WALL AND CEILING HEATERS

- A. Description: Factory-packaged units constructed according to UL 499. An assembly including chassis, electric heating coil, fan, motor, and controls.
- B. Cabinet:
  - 1. Front Panel: Stamped steel louver, with removable panels fastened with tamperproof fasteners.
  - 2. Finish: Baked enamel over baked-on primer with color selected by Architect, applied to factory-assembled and factory-tested wall and ceiling heaters before shipping.
- C. Surface Mounted Cabinet Enclosure: Steel with finish to match cabinet.
- D. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and hum, embedded in magnesium oxide refractory and sealed in corrosion-resistant metallic sheath. Terminate elements in stainless steel, machine-staked terminals secured with stainless steel hardware, and limit controls for high temperature protection. Provide integral circuit breaker for overcurrent protection.
- E. Fan: Aluminum propeller directly connected to motor.
- F. Motor: Permanently lubricated//, multispeed//. Comply with requirements in Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC EQUIPMENT.
- G. Controls: Unit-mounted thermostat. //Low-voltage relay with transformer kit.//
- H. Electrical Connection: Factory wire motors and controls for a single field connection// with disconnect switch//.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to receive unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for electrical connections to verify actual locations before unit heater installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

- A. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no additional cost or time to the Government.
- B. Install wall boxes in finished wall assembly; seal and weatherproof.
- C. Install cabinet unit heaters to comply with NFPA 90A.
- D. Install propeller unit heaters level and plumb.
- E. Suspend cabinet unit heaters from structure with elastomeric hangers// and seismic restraints//.
- F. Suspend propeller unit heaters from structure with all-thread hanger rods and elastomeric hangers.

**3.3 CONNECTIONS**

- A. Ground electric convection heating units according to Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- B. Connect wiring according to Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).

**3.4 //SEISMIC BRACING**

- A. Where applicable provide Seismic bracing as required under specification Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.//

**3.5 STARTUP AND TESTING**

- A. Make tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.
- B. When any defects are detected, correct defects and repeat test at no additional cost or time to the Government.
- C. //The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the COR and Commissioning Agent. Provide a minimum notice of 10 working days prior to startup and testing.//

**3.6 //COMMISSIONING**

- A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.
- B. Components provided under this section of the specification will be tested as part of a larger system.//

**3.7 DEMONSTRATION AND TRAINING**

- A. Provide services of manufacturer's technical representative for //four// // // hour//s// to instruct each VA personnel responsible in the operation and maintenance of units.
- B. //Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.//

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