SECTION 238239

UNIT HEATERS

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 1 Specification with completely editable text; therefore, any portion of the text can be modified by the A/E preparing the Solicitation Package to suit the project.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

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1. GENERAL
	1. SUMMARY
		1. Section Includes:
			1. Cabinet unit heaters with centrifugal fans and hot-water coils.
			2. Propeller unit heaters with hot-water coils.
			3. Wall and ceiling heaters with propeller fans and electric-resistance heating coils.
	2. SUBMITTALS
		1. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each product indicated.
		2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
			1. Plans, elevations, sections, and details.
			2. Location and size of each field connection.
			3. Equipment schedules to include rated capacities, furnished specialties, and accessories.
		3. Field quality-control test reports.
		4. Operation and maintenance data.
	3. QUALITY ASSURANCE
		1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. PRODUCTS
	1. CABINET UNIT HEATERS
		1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
			1. Airtherm; a Mestek Company.
			2. Berko Electric Heating; a division of Marley Engineered Products.
			3. Carrier Global Corporation.
			4. Chromalox, Inc.
			5. Dunham-Bush, Inc.
			6. Engineered Air Ltd.
			7. Indeeco.
			8. International Environmental Corporation.
			9. Markel Products; a division of TPI Corporation.
			10. Marley Electric Heating; a division of Marley Engineered Products.
			11. Daikin Applied Americas.
			12. Ouellet Canada Inc.
			13. QMark Electric Heating; a division of Marley Engineered Products.
			14. Rosemex Products.
			15. Trane Technologies.
			16. USA Coil & Air.
		2. Description: A factory-assembled and -tested unit complying with ARI 440.

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**NOTE TO SPECIFIER**

Retain subparagraph below for electric cabinet unit heaters.

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* + - 1. Comply with UL 2021.
		1. Coil Section Insulation: Glass-fiber insulation; surfaces exposed to airstream shall be aluminum-foil facing to prevent erosion of glass fibers.
			1. Thermal Conductivity (k-Value): 0.26 Btu x in./h x sq. ft. at 75 deg F mean temperature.
			2. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
			3. Adhesive: Comply with ASTM C 916 and with NFPA 90A or NFPA 90B.

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**NOTE TO SPECIFIER**

Retain paragraph and subparagraphs below for surface, semi-recessed, and fully recessed units. Cabinet is not required for concealed units.

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* + 1. Cabinet: Steel with baked-enamel finish with manufacturer's standard paint, in color selected by Architect.
			1. Vertical Unit, Exposed Front Panels: Minimum 0.0528-inch-thick, galvanized, sheet steel, removable panels with channel-formed edges secured with tamperproof cam fasteners.
			2. Horizontal Unit, Exposed Bottom Panels: Minimum 0.0528-inch-thick, galvanized, 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 0.0528-inch- thick steel, finished to match cabinet, [Insert dimension] high with leveling bolts.

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**NOTE TO SPECIFIER**

Verify available filter types with manufacturer. Indicate filter thickness in "Capacities and Characteristics" Paragraph in this Article or in the Cabinet Unit Heater Schedule on Drawings.

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* + 1. Filters: Minimum arrestance according to ASHRAE 52.1 and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
			1. Washable Foam: 70 percent arrestance and 3 MERV.
			2. Glass Fiber Treated with Adhesive: 80 percent arrestance and 5 MERV.
			3. Pleated: 90 percent arrestance and 7 MERV.

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**NOTE TO SPECIFIER**

Retain one of first two paragraphs below.

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* + 1. Hot-Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain.
		2. 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.
		3. 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 Division 23 Section "Common Motor Requirements for HVAC Equipment."
			3. Wiring Terminations: Connect motor to chassis wiring with plug connection.

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**NOTE TO SPECIFIER**

Retain first paragraph and applicable subparagraphs below to require factory-piping package.

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* + 1. Factory, Hot-Water Piping Package: ASTM B 88, Type L copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet and outlet.
			1. Hose Kits: Minimum 400-psig working pressure, and operating temperatures from 33 to 211 deg F. Tag hose kits to equipment designations.
				1. Minimum Diameter: Equal to cabinet unit heater connection size.
			2. Two-Piece, Ball Valves: Bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and 600-psig minimum CWP rating and blowout-proof stem.
			3. Calibrated-Orifice Balancing Valves: Bronze body, ball type, 125-psig working pressure, 250 deg F maximum operating temperature; with calibrated orifice or venture, connection for portable differential pressure meter with integral seals, threaded ends, and equipped with a memory stop to retain set position.
			4. Y-Pattern, Hot-Water Strainers: Cast-iron body (ASTM A 126, Class B); 125-psig minimum working pressure; with threaded connections, bolted cover, perforated stainless-steel basket, and bottom drain connection. Include minimum NPS 1/2 threaded pipe and full-port ball valve in strainer drain connection.
			5. Wrought-Copper Unions: ASME B16.22.
		2. Control devices and operational sequences are specified in Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls."

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**NOTE TO SPECIFIER**

Retain paragraph above and delete paragraph and subparagraphs below if controls are part of overall temperature-control system.

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* + 1. Basic Unit Controls:
			1. Control voltage transformer.
			2. Unit-mounted thermostat with the following features.
				1. Heat-off switch.
				2. Fan on-auto switch.

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**NOTE TO SPECIFIER**

Retain first subparagraph below if multispeed motors are specified.

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* + - * 1. Manual fan speed switch.
				2. Adjustable deadband.
				3. Concealed set point.
				4. Deg F indication.
			1. Unit-mounted temperature sensor.
			2. Unoccupied period override push button.
			3. Data entry and access port.
				1. Input data includes room temperature, and occupied and unoccupied periods.
				2. Output data includes room temperature, supply-air temperature, entering-water temperature, operating mode, and status.
		1. Electrical Connection: Factory wire motors and controls for a single field connection.

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**NOTE TO SPECIFIER**

If Project has more than one type or configuration of heater, delete paragraph and subparagraphs below and schedule cabinet unit heaters on Drawings.

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* 1. PROPELLER UNIT HEATERS
		1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
		2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
			1. Airtherm; a Mestek Company.
			2. Engineered Air Ltd.
			3. McQuay International.
			4. Rosemex Products.
			5. Ruffneck Heaters; a division of Lexa Corporation.
			6. Trane.
		3. Description: An assembly including casing, coil, fan, and motor in [vertical][horizontal] discharge configuration with adjustable discharge louvers.

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**NOTE TO SPECIFIER**

Retain subparagraph below for for electric unit heaters.

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* + 1. Comply with UL 2021.
		2. Cabinet: Removable panels for maintenance access to controls.
		3. Cabinet Finish: Manufacturer's standard baked enamel applied to factory-assembled and -tested propeller unit heater before shipping.
		4. Discharge Louver: Adjustable fin diffuser for horizontal units and conical diffuser for vertical units.
		5. Hot-Water Coil: Test and rate hot-water propeller unit heater coils according to ASHRAE 33. Copper tube, minimum 0.025-inch wall thickness, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 325 deg F, with manual air vent. Test for leaks to 350 psig underwater.
		6. 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 0.16 inch. Element ends shall be enclosed in terminal box. Fin surface temperature shall not exceed 550 deg 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.
		7. Fan: Propeller type with aluminum wheel directly mounted on motor shaft in the fan venturi.
		8. Fan Motors: Comply with requirements in"" Division 23 Section "Common Motor Requirements for HVAC Equipment."
			1. Motor Type: Permanently lubricated.

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**NOTE TO SPECIFIER**

Delete first paragraph below if controls are part of control system specified in Division 23 Section "Instrumentation and Control for HVAC."

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* + 1. Control Devices: Unit-mounted thermostat.
	1. WALL AND CEILING HEATERS
		1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
			1. Berko Electric Heating; a division of Marley Engineered Products.
			2. Chromalox, Inc.; a division of Emerson Electric Company.
			3. Indeeco.
			4. Markel Products; a division of TPI Corporation.
			5. Marley Electric Heating; a division of Marley Engineered Products.
			6. Ouellet Canada Inc.
			7. QMark Electric Heating; a division of Marley Engineered Products.
			8. Trane.
		2. Description: An assembly including chassis, electric heating coil, fan, motor, and controls. Comply with UL 2021.
		3. Cabinet:
			1. Front Panel: Stamped-steel louver, with removable panels fastened with tamperproof fasteners.
			2. Finish: Baked enamel over baked-on primer with manufacturer's standard color selected by Architect, applied to factory-assembled and -tested wall and ceiling heaters before shipping.
		4. Surface-Mounting Cabinet Enclosure: Steel with finish to match cabinet.
		5. 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.]
		6. Fan: Aluminum propeller directly connected to motor.
			1. Motor: Permanently lubricated[, multispeed]. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
		7. Controls: Unit-mounted thermostat.[ Low-voltage relay with transformer kit.]
		8. Electrical Connection: Factory wire motors and controls for a single field connection with disconnect switch.
1. EXECUTION
	1. INSTALLATION
		1. Install unit heaters to comply with NFPA 90A.

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**NOTE TO SPECIFIER**

Edit supports below for facilities location in seismic zones.

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* + 1. Suspend cabinet unit heaters from structure with elastomeric hangers [ and seismic restraints]. Vibration isolators [ and seismic restraints] are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
		2. Suspend propeller unit heaters from structure with all-thread hanger rods and [elastomeric hangers] [spring hangers] [spring hangers with vertical-limit stop]. Hanger rods and attachments to structure are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment." Vibration hangers are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

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**NOTE TO SPECIFIER**

Retain paragraph below if controls are provided by unit heater manufacturer. To comply with requirements of the Americans with Disabilities Act, verify mounting height with authorities having jurisdiction

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* + 1. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.

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**NOTE TO SPECIFIER**

Retain first paragraph below for hot-water unit heaters.

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* + 1. Unless otherwise indicated, install union and gate or ball valve on supply-water connection and union and calibrated balancing valve on return-water connection of unit heater.
		2. Install new filters in each fan-coil unit within two weeks of Substantial Completion.
		3. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
		4. Install piping adjacent to machine to allow service and maintenance.
		5. Connect piping to cabinet unit heater's factory, hot-water piping package. Install the piping package if shipped loose.

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**NOTE TO SPECIFIER**

Retain paragraph below for concealed cabinet unit heaters. Coordinate duct installation requirements with Drawings and with requirements specified in Division 23 Sections "Metal Ducts," and "Air Duct Accessories."

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* + 1. Connect supply and return ducts to cabinet unit heaters with flexible duct connectors specified in Division 23 Section "Air Duct Accessories."

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**NOTE TO SPECIFIER**

Retain first paragraph below for cabinet unit heaters with hot-water coils.

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* + 1. Comply with safety requirements in UL 1995.
		2. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
		3. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
	1. FIELD QUALITY CONTROL
		1. Perform the following field tests and inspections and prepare test reports:
			1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

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**NOTE TO SPECIFIER**

Retain first subparagraph below for units that have electric-resistance heating coils.

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* + - 1. Operate electric heating elements through each stage to verify proper operation and electrical connections.
			2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
		1. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022