SECTION 233600

AIR TERMINAL UNITS

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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. Fan-powered air terminal units.
			2. Shutoff, single-duct air terminal units.
	2. PERFORMANCE REQUIREMENTS
		1. Structural Performance: Hangers and supports and seismic restraints (if required by location) shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems".
	3. SUBMITTALS
		1. Product Data: For each type of product indicated.
		2. Shop Drawings: For air terminal units. Include plans, elevations, sections, details, and attachments to other work.
		3. Operation and maintenance data.
	4. QUALITY ASSURANCE
		1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
		2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."
2. PRODUCTS

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**NOTE TO SPECIFIER**

Verify manufacturer information, Product numbers, and availability at time of Project Manual preparation for Project.

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* 1. FAN-POWERED AIR TERMINAL UNITS
		1. 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. Carnes.
			2. Environmental Technologies, Inc.
			3. Krueger.
			4. METALAIRE, Inc.
			5. Nailor Industries Inc.
			6. Price Industries.
			7. Titus.
			8. Trane Technologies.
		2. Configuration: Volume-damper assembly and fan in parallel arrangement inside unit casing with control components inside a protective metal shroud.
		3. Casing: 0.034-inch steel, single wall.
			1. Casing Lining: Adhesive attached, 1/2-inch-thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
				1. Cover liner with nonporous foil.
			2. Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.
			3. Air Outlet: S-slip and drive connections.
			4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.
			5. Fan: Forward-curved centrifugal, located at plenum air inlet.
			6. Retain subparagraph below to comply with LEED-NC Prerequisite EQ 1.
			7. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
		4. Volume Damper: Galvanized steel with flow-sensing ring and peripheral gasket and self-lubricating bearings.
			1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.
		5. Velocity Sensors: Multipoint array with velocity sensors in cold- and hot-deck air inlets and air outlets.
		6. Motor:
			1. Fan-Motor Assembly Isolation: Rubber isolators.
			2. Verify availability of enclosure types with manufacturer of specified equipment. Delete "Enclosure" Subparagraph below if information is included in schedule on Drawings.
			3. Efficiency: Premium efficient ECM

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**NOTE TO SPECIFIER**

Edit the two paragraphs below based on actual heating coils for Project.

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* + 1. Hydronic Coils: 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 valve.
			1. Location: Plenum air inlet.
		2. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware.
			1. Location: Plenum air inlet.
			2. Access door interlocked disconnect switch.
			3. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable.)
			4. Nickel chrome 80/20 heating elements.
			5. Airflow switch for proof of airflow.
			6. Fan interlock contacts.
			7. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
			8. Magnetic contactor for each step of control (for three-phase coils).
		3. Direct Digital Controls: Single-package unitary controller and actuator specified in Division 25 Section "Building Automation System (BAS) General".
	1. SHUTOFF, SINGLE-DUCT AIR TERMINAL UNITS
		1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
			1. Carnes.
			2. Environmental Technologies, Inc.
			3. Krueger.
			4. METALAIRE, Inc.
			5. Nailor Industries Inc.
			6. Price Industries.
			7. Titus.
			8. Trane Technologies.
		2. Casing: 0.034-inch steel, single wall.
			1. Casing Lining: Adhesive attached, 1/2-inch-thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
				1. Cover liner with nonporous foil.
			2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
			3. Air Outlet: S-slip and drive connections, size matching inlet size.
			4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.
			5. Retain subparagraph below to comply with LEED-NC Prerequisite EQ 1.
			6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
		3. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
			1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.

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**NOTE TO SPECIFIER**

Edit the two paragraphs below based on actual heating coils for Project.

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* + 1. Hydronic Coils: 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 valve.
		2. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware.
			1. Access door interlocked disconnect switch.
			2. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable.)
			3. Nickel chrome 80/20 heating elements.
			4. Airflow switch for proof of airflow.
			5. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
			6. Magnetic contactor for each step of control (for three-phase coils).
		3. Direct Digital Controls: Single-package unitary controller and actuator specified in Division 25 Section "Building Automation System (BAS) General".
	1. SOURCE QUALITY CONTROL
		1. Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ARI certification seal.
1. EXECUTION
	1. INSTALLATION
		1. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
		2. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.
	2. HANGER AND SUPPORT INSTALLATION
		1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
		2. Hangers Exposed to View: Threaded rod and angle or channel supports.
		3. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
	3. CONNECTIONS
		1. Install piping adjacent to air terminal unit to allow service and maintenance.
		2. Hot-Water Piping: In addition to requirements in Division 23 Section "Hydronic Piping," connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.
		3. Connect ducts to air terminal units according to Division 23 Section "Metal Ducts."
		4. Coordinate duct installations and specialty arrangements with Drawings.
		5. Make connections to air terminal units with flexible connectors complying with requirements in Division 23 Section "Duct Accessories."
	4. IDENTIFICATION
		1. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows. Comply with requirements in Division 23 Section "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.
	5. FIELD QUALITY CONTROL
		1. Tests and Inspections:
			1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
			2. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
			3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
			4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
		2. Air terminal unit will be considered defective if it does not pass tests and inspections.
	6. STARTUP SERVICE
		1. Perform startup service.
			1. Complete installation and startup checks according to manufacturer's written instructions.
			2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
			3. Verify that controls and control enclosure are accessible.
			4. Verify that control connections are complete.
			5. Verify that nameplate and identification tag are visible.
			6. Verify that controls respond to inputs as specified.
	7. DEMONSTRATION
		1. Train Owner's maintenance personnel to adjust, operate, and maintain air terminal units.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022