SECTION 235216

CONDENSING BOILERS

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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. This Section includes packaged, factory-fabricated and -assembled, gas-fired, pulse-combustion condensing boilers, trim, and accessories for generating hot water.
		2. Specification of Condensing Boilers requires that heating hot water system is able to operate at lower temperatures during significant operational hours to allow the unit(s) to go into condensing mode and provide the necessary efficiency improvements that will justify the additional first costs.
		3. Boiler plants shall be sized to meet the heating load requirement of building as defined by computerized load calculations. Redundant boilers shall be avoided and the quantity should be limited to three or four maximum at the boiler plant. Loss of a single boiler should be able to still provide up to 65% of the peak heating load for typical USPS facilities. Plant redundancy is provided by the number of boilers and not excess capacity.
	2. SUBMITTALS
		1. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
		2. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.

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**NOTE TO SPECIFIER**

Retain paragraph below if required by seismic criteria applicable to Project.

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* + - * 1. Manufacturer Seismic Qualification Certification: Submit certification that boiler, accessories, and components will withstand seismic forces defined in Division 23 Section "Mechanical Vibration and Seismic Controls."
				2. Operation and maintenance data.
				3. Warranty: Special warranty specified in this Section.
			1. 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. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.
				3. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."

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**NOTE TO SPECIFIER**

Delete first paragraph below if boiler rating exceeds 300,000 Btu/h (87.9 kW).

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* + - * 1. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N, "Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers."
				2. UL Compliance: Test boilers for compliance with UL 795, "Commercial-Industrial Gas Heating Equipment." Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.
			1. WARRANTY
				1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period.

Warranty Period for Pulse-Combustion Boilers:

Heat Exchanger Damaged by Thermal Shock: 10 years from date of Substantial Completion.

Heat-Exchanger Corrosion: Prorated for five years from date of Substantial Completion.

1. PRODUCTS
	* + 1. MANUFACTURERS
				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:

AERCO International.

Fulton Boiler Works, Inc.

Gasmaster Industries Incorporated.

* + - 1. MANUFACTURED UNITS
				1. Description: Factory-fabricated, -assembled, and -tested, pulse-combustion condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls.
				2. Heat Exchanger: Type 316L, stainless-steel primary and secondary combustion chamber.
				3. Pressure Vessel: Carbon steel with welded heads and tube connections.
				4. Exhaust Decoupler: Fiberglass composite material in a corrosion-resistant steel box.
				5. Burner: [Natural] [Propane] gas, self-aspirating and self-venting after initial start.
				6. Blower: Centrifugal fan to operate only during start of each burner sequence.

Motors: Comply with requirements specified in Division 23 Section "Motors."

Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

* + - * 1. Gas Train: Combination gas valve with manual shutoff and pressure regulator.
				2. Ignition: Spark ignition with 100 percent main-valve shutoff with electronic flame supervision.
				3. Casing:

Jacket: Sheet metal, with snap-in or interlocking closures.

Control Compartment Enclosure: NEMA 250, Type 1A.

Finish: Baked-enamel or powder-coated protective finish.

Insulation: Minimum 2-inch-thick, mineral-fiber insulation surrounding the heat exchanger.

Combustion-Air Connection: Inlet duct collar and sheet metal closure over burner compartment.

Mounting base to secure boiler to concrete base.

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**NOTE TO SPECIFIER**

Retain subparagraph below for projects in seismic areas.

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Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler pressure vessel, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Mechanical Vibration and Seismic Controls" when mounting base is anchored to building structure.

* + - * 1. Mufflers: Carbon-steel intake muffler and stainless-steel exhaust.
				2. Condensate Trap: Cast-iron body with stainless-steel internal parts.
			1. TRIM
				1. Aquastat Controllers: Operating and high limit.
				2. Safety Relief Valve: ASME rated.
				3. Pressure and Temperature Gage: Minimum 3-1/2-inch- (89-mm-) diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.
				4. Boiler Air Vent: Automatic.
				5. Drain Valve: Minimum NPS 3/4 (DN 20) hose-end gate valve.

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**NOTE TO SPECIFIER**

Retain paragraph below if pump is a component of boiler. Coordinate with Division 23 Section "Hydronic Pumps.

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* + - * 1. Circulation Pump: Non-overloading, in-line pump with split-capacitor motor having thermal-overload protection and lubricated bearings; designed to operate at specified boiler pressures and temperatures.
			1. CONTROLS
				1. Refer to specification Section 250504 Building Automation System (BAS) General."
				2. Boiler operating controls shall include the following devices and features:

Control transformer.

Set-Point Adjust: Set points shall be adjustable.

Sequence of Operation: Refer to Section 259004 – Sequence of Operation for coordination.

Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.

* + - * 1. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.

High Cutoff: Automatic reset stops burner if operating conditions rise above maximum boiler design temperature.

Low-Water Cutoff Switch: Electronic probe shall prevent burner operation on low water. Cutoff switch shall be automatic-reset type.

Blocked Inlet Safety Switch: Manual-reset pressure switch field mounted on boiler combustion-air inlet.

Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.

* + - * 1. Building Automation System Interface: Factory install hardware and software to enable building automation system to monitor, control, and display boiler status and alarms. Refer to specification Section 250504 Building Automation System (BAS) General.
			1. ELECTRICAL POWER
				1. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26 Sections.
				2. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.

House in NEMA 250, Type 1 enclosure.

Wiring shall be numbered and color-coded to match wiring diagram.

Provide branch power circuit to each motor and to controls with a disconnect switch or circuit breaker.

Provide each motor with overcurrent protection.

* + - 1. VENTING

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**NOTE TO SPECIFIER**

Edit venting and intake requirements below to suit project specifics.

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* + - * 1. Combustion Vent: Complete system, ASTM A 959, Type 29-4C stainless steel,pipe or Sch 40 CPVC piping pipe, vent terminal, thimble, indoor plate, vent adapter, condensate trap and dilution tank, and sealant.
				2. Combustion-Air Intake: Complete system, stainless steel or Sch 40 CPVC, pipe, vent terminal with screen, inlet air coupling, and sealant.
			1. SOURCE QUALITY CONTROL
				1. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
1. EXECUTION
	* + 1. BOILER INSTALLATION
				1. Install boilers level on concrete base. Concrete base is specified in Division 23 Section "Common Work for HVAC," and concrete materials and installation requirements are specified in Division 3.
				2. Vibration Isolation: Elastomeric isolation pads with a minimum static deflection of 0.25 inch (6.35 mm).
				3. Install gas-fired boilers according to NFPA 54.
				4. Assemble and install boiler trim.
				5. Install electrical devices furnished with boiler but not specified to be factory mounted.
				6. Install control wiring to field-mounted electrical devices.
			2. CONNECTIONS
				1. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
				2. Install piping adjacent to boiler to allow service and maintenance.
				3. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
				4. Connect piping to boilers, except safety relief valve connections, with flexible connectors of materials suitable for service. Flexible connectors and their installation are specified in Division 22 Section "Common Work for Plumbing."
				5. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas train connection. Provide a reducer if required.
				6. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve and union or flange at each connection.
				7. Install piping from safety relief valves to nearest floor drain.
				8. Boiler Venting:

Install flue venting kit and combustion-air intake.

* + - * 1. Ground equipment according to Division 26 Section "Grounding and Bonding."
				2. Connect wiring according to Division 26 Section "Conductors and Cables."
				3. Stack drain piping shall be routed through an acid neutralizing tank to prevent damage to piping, floors and floor drains and to prevent highly acidic waste from entering the sanitary drain system.
			1. FIELD QUALITY CONTROL
				1. Tests and Inspections:

Perform installation and startup checks according to manufacturer's written instructions.

Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.

Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature.

Set field-adjustable switches and circuit-breaker trip ranges as indicated.

* + - * 1. Remove and replace malfunctioning units and retest as specified above.
				2. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions.
			1. DEMONSTRATION
				1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain boilers. Video training sessions. Refer to Division 1 Section "Demonstration and Training."

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022