SECTION 23 52 16

condensing boilers

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General

* 1. SUMMARY
		1. Section Includes:
			1. Gas-fired, High-efficiency, Condensing Boilers.
			2. Condensing Boiler Rack Systems.
	2. Definitions

Gas-fired, High-efficiency, Condensing Boilers: Wall mounted, forced-draft, fire tube, commercial condensing boiler for generating hot water.

* 1. Submittals
		1. Submit in accordance with requirements of Section 01 30 00 - Administrative Requirements.
		2. Product Data: Manufacturer's technical data sheets, specifications, performance data and installation instructions for all products referenced in the scope of work defined in this section.
		3. Shop Drawings: Submit shop drawings required to depict the requirements for fabrication and installation. Include the following drawings as applicable:
			1. Include dimension drawings of boilers indicating components and connections to other equipment and piping.
			2. Include heat-exchanger dimensions, size of tappings, and performance data.
	2. Closeout Submittals
		1. Provide original manufacturer’s installation and operation manuals.
		2. Provide written manufacturer’s warranty.
	3. Quality Assurance
		1. Manufacturer Qualifications: Primary products in this section to be provided by a manufacturer with no less than five years of experience producing the products specified in this section at a facility in the United States.
		2. Installer's Qualifications: All work specified in this section is to be completed by a firm with demonstrated experience installing systems similar in scope and complexity to those specified.
	4. Delivery, Storage and Handling
		1. Deliver, store and handle materials and products in accordance with the manufacturer's instructions and recommendations and industry standards.
		2. Store all materials in the manufacturer’s original packaging until ready for installation. Protect all products from damage or exposure to adverse environmental conditions, including weather, humidity, and dust.
		3. Provide temporary inlet and outlet caps, maintain caps in place until installation.
	5. Project Conditions
		1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
	6. Warranty
		1. Manufacturer’s Warranty: Manufacturer agrees to replace products that fail within the specified warranty period.
			1. Failure Methods: Condensate corrosion, thermal stress, mechanical defects, or workmanship.
			2. Heat Exchanger: 15 years from date of Substantial Completion under standard or controlled regulation.
			3. All Other Parts and Components: 5 years from date of Substantial completion.
1. Products
	1. MANUFACTURERS

[Specifier Notes] – Retain the following Paragraph if this document is a PROPRIETARY Specification, with Navien’s products listed as the Basis of Design. Delete if not required.

* + 1. Basis of Design Manufacturer: Navien Inc.
			1. 20 Goodyear, Irvine, CA 92618.
			2. Website: www.navieninc.com.
			3. Phone: (800) 519-8794.

[Specifier Notes] – Retain the following Paragraph if this document is written as a PERFORMANCE specification, without listing a manufacturer as a basis of design. Insert manufacturers that sell products comparable to those specified in this section. Delete if not required.

* + 1. Provide products by one of the following manufacturers subject to compliance with the requirements below:
			1. Navien Inc.
			2. Or Equal.
		2. Substitution Limitations:
			1. Submit substitution requests in accordance with provisions of Section 01 60 00.
			2. Single manufacturer to provide, from a single source, primary products and accessories specified in this section.
	1. PERFORMANCE REQUIREMENTS
		1. Certifications: Provide products with heat exchanger that has the following certification labels.
			1. ANSI and CSA marks for the United States and Canada.
			2. AHRI certification for the United States and Canada.
		2. ASME Compliance: Fabricate and label boilers with ASME H-stamp in accordance with ASME Boiler and Pressure Vessel Code
		3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and use.
		4. ASHRAE/IES Compliance: Fabricate boilers to comply with minimum efficiency requirements of ASHRAE/IES 90.1.
		5. Energy Star Compliance: Fabricate and label equipment in compliance with Energy Star requirements.
		6. SCAQMD Rule 1146.2 Type 1 Compliance: Provide units with low nitrous oxide emissions that meet or exceed 14 ng/j or 20 ppm NOx requirements at 3%.
	2. System Requirements
		1. General: Provide wall-mounted, forced draft, fire tube, condensing boiler with microprocessor control and a direct electronic ignition system (with no standing pilot), fully modulating gas control valve, automatic electro-mechanical water flow control valve, and water temperature thermistors to maintain outlet water temperature between ± 2°F of set point temperature. Microprocessor shall have built in gas flow control logic to regulate pump heating cycles, dry contact relays for boiler pump and up to three zone pumps, low voltage terminal for up to three thermostats, and shall be compatible and DHW priority zone systems.
		2. Controls: Provide 7 inch touch screen control module with auxiliary USB connectivity.
		3. Junction Box: Provide pre-installed electrical junction box.
		4. Modulation Range: From 6.67 percent to 100 percent full fire (15:1 turndown ratio).
		5. Thermal Efficiency: Provide Boiler with thermal efficiency of no less than percent 97.5 percent, according to AHRI certification standards.
		6. Burners: Provide forced draft boiler with low-profile downward fired burners, solid brass water flow control valve, and solid brass inlet and outlet water connections.
		7. Heat Exchanger Construction: 400 series stainless steel with non-metallic drain pan.
		8. Casing: Cold rolled carbon steel.
		9. Venting:
			1. Material: Provide PVC, CPVC, polypropylene, or stainless steel vent pipes sizes to match boiler connections.
			2. Maximum equivalent venting length: Up to 60 feet with 3 inch diameter vents and up to 150 feet with 4 inch diameter vents.
	3. Gas-Fired High-Efficiency Condensing Boilers.
		1. General: ANSI Z21.13/CSA 4.9 for gas-fired, high-efficiency condensing boilers.

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* + - 1. Basis of Design Product: Navien NFB, Model 301C.
			2. Heating Capacity: 293 MBH.
			3. Water Capacity: 7.6 gallons.
			4. Water Pressure Rating: 160psi.
			5. Electrical: Provide 120 V/60 Hz AC power source, with a maximum power consumption of less than 12 amperes.
			6. Fuel: Natural Gas or Propane.
				1. Heating Input: 20 to 301 MBH.
				2. Gas Supply Pressure:

Natural Gas: 3.5 to 10.5 inches of water column.

Propane: 8.0 to 13.5 inches of water column.

* + - 1. Fittings:
				1. Heating Supply: Top and bottom located, 1-1/4 inch diameter connections.
				2. Heating Return: Top and bottom located, 1-1/4 inch diameter connections.
				3. Gas Connection: 3/4 inch diameter.
				4. Condensate Outlet: 3/4 inch diameter.
		1. General: ANSI Z21.13/CSA 4.9 for gas-fired, high-efficiency condensing boilers.

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* + - 1. Basis of Design Product: Navien NFB, Model 399C.
			2. Heating Capacity: 389 MBH.
			3. Water Capacity: 9.6 gallons.
			4. Water Pressure Rating: 160psi.
			5. Electrical: Provide 120 V/60 Hz AC power source, with a maximum power consumption of less than 12 amperes.
			6. Fuel: Natural Gas or Propane.
				1. Heating Input: 26 to 399 MBH.
				2. Gas Supply Pressure:

Natural Gas: 3.5 to 10.5 inches of water column.

Propane: 8.0 to 13.5 inches of water column.

* + - 1. Fittings:
				1. Heating Supply: Top and bottom located, 1-1/2 inch diameter connections.
				2. Heating Return: Top and bottom located, 1-1/2 inch diameter connections.
				3. Gas Connection: 3/4 inch diameter.
				4. Condensate Outlet: 3/4 inch diameter.
	1. Tankless Rack Systems
		1. Tankless Free-Standing Rack System – Base Kit.
			1. Capacity: Single unit, front mounted or Two unit, mounted Back-to-back.
			2. Rack Frame: 1.5 inch square tube 14 gauge hot rolled steel.
		2. Tankless Free-Standing Rack System – Add-on Kit.
			1. Capacity: Additional single unit mounted in-line or Two units, mounted Back-to-back, per Add-on Kit.
			2. Rack Frame: 1.5 inch square tube 14 gauge hot rolled steel.
	2. ACCESSORIES
		1. Venting System: Exhaust manifold shall be a minimum of 3”, of either polypropylene or schedule 40 PVC/CPVC with horizontal or vertical termination.
			1. Provide common vent system allowing up to four units to vent through 3” or 4” vent diameter in the same system.
			2. Provide system capable of configuring vent intake and exhaust in different pressure planes.
			3. System should include vent collars, collar dampers and cascade communication cables for each common vented boiler.
		2. Building Automation Protocol Gateway: Provide WI-FI connected gateway capable of the converting equipment data to BACnetMS/TP, BACnet/IP, and ModbusTCP protocols.
		3. LonWorks Gateway: Provide gateway capable of the converting equipment data to LonWorks protocol.
		4. Multi-Zone Pump Controller: Zone pump controller designed to allow for control of two to six zone pumps.
		5. Wireless Control Module: Provide control module to allow for Wi-Fi connectivity and remote access to Navien water heater system controls.
			1. Network Standard: 2.4 GHz, IEEE std, 802.11 b/g/n (20MHz); 11 channels.
			2. Electrical Power: 100-240 VAC, 50-60 Hz. Output 12 VDC, 1A.
			3. Operational Temperature: 0 degrees C to 40 degrees C (32 F to 104 F).
1. EXECUTION
	1. Examination
		1. Do not begin work until adjacent substrates have been properly prepared to receive work specified in this section.
		2. Verify that locations of concealed reinforcements have been clearly marked for the installer.
		3. Locate reinforcement points and clearly mark their locations if not already done.
	2. Preparation
		1. Clean surfaces prior to installation.
		2. Protect all adjacent surfaces from possible damage during installation of units.
		3. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
	3. Installation
		1. Coordinate with plumbing piping, fuel piping, and related electrical work to achieve operating system.
		2. Install in accordance with manufacturer’s current installation instructions, industry recognized best practices, and all code bodies having jurisdiction; do not install damaged products.
		3. Test for proper operation and adjust until satisfactory results are obtained, including start-up and check out procedures as recommended by the manufacturer.
		4. Protect adjacent finishes from damage during installation using manufacturer’s recommendations.
	4. Cleaning and Protection
		1. Clean and remove all grime or other soils using manufacturer’s recommended methods.
		2. Damaged products must be repaired or replaced prior to substantial completion.
		3. Protect installed products until completion of work specified in this section.

END OF SECTION