SEMI-INSTANTANEOUS U-TUBE DOMESTIC WATER HEAT EXCHANGER

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS
				1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			2. SUMMARY
				1. Section Includes: packaged, factory-fabricated and assembled, semi-instantaneous u-tube domestic water heater, trim, and accessories for generating hot water.

Semi-Instantaneous u-tube domestic-water heat exchangers.

* + - 1. SUBMITTALS

First two paragraphs below are defined in Division 01 Section "Submittal Procedures" as "action submittals."

* + - * 1. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.

Retain first paragraph below if equipment includes wiring.

* + - * 1. Shop Drawings: For semi-instantaneous u-tube domestic heat exchanger, trim, and accessories. Include plans, elevations, sections, details, and attachments to other work

Remaining paragraphs are defined in Division 01 Section "Submittal Procedures" as "informational submittals."

Retain first paragraph below for product certificates from manufacturers.

* + - * 1. Source quality-control reports.
				2. Field quality-control reports.
				3. Operation and Maintenance Data: For semi-instantaneous u-tube domestic heat exchanger to include in emergency, operation, and maintenance manuals.
				4. Warranty: Sample of special warranty.
			1. 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.

LEED-NC Prerequisite EA 2 requires that domestic-water heat exchangers comply with ASHRAE/IESNA 90.1, including equipment efficiency indicated in table titled "Performance Requirements for Water Heating Equipment."

* + - * 1. ASME Compliance: Where ASME-code construction is indicated, fabricate and label heat-exchanger storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
				2. Manufacture’s Qualifications

Compliant with ARRA (American Recovery and  Reinvestment  Act of 2009)

Manufactures must have at least 50 years of manufacturing experience.

* + - 1. COORDINATION
				1. Coordinate sizes and locations of concrete bases with actual equipment provided.
			2. WARRANTY

When warranties are required, verify with Owner's counsel that special warranties stated in this article are not less than remedies available to Owner under prevailing local laws.

* + - * 1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of the domestic-water heat exchangers that fails in materials or workmanship within specified warranty period.

Failures include, but are not limited to, the following:

Structural failures including heat exchanger, vessel, and supports.

Faulty operation of controls.

Deterioration of metals, metal finishes, and other materials beyond normal use.

Verify available warranties for units and components with manufacturers listed in Part 2 articles.

Warranty Periods: Semi-Instantaneous u-tube domestic-water heat exchanger: 18 months from shipment or 12 months from startup, whichever occurs first.

Extended Warranty: **<Ten (10) years for the shell and heat exchanger / Ten (10) year for the shell and twenty (20) for the heat exchanger>**. Details specified in manufacture’s documentation. (optional)

1. PRODUCTS

See discussions on various types of domestic-water heat exchangers in the Evaluations for minimum and maximum limits on capacity and recovery of domestic-water heat exchangers in this Section.

* + - 1. SEMI-INSTANTANEOUS U-TUBE DOMESTIC-WATER HEAT EXCHANGERS
				1. Semi-Instantaneous U-Tube Domestic-Water Heat Exchangers:

See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers. Retain one of first two subparagraphs and list of manufacturers below. See Division 01 Section "Product Requirements."

Manufacturers: Subject to compliance with requirements**,** provide products by one of the following:

Ace Heaters

Aerco

Patterson-Kelly

Retain option in first subparagraph below if manufacturer's name and model number are indicated in schedules or plans on Drawings; delete option and insert manufacturer's name and model number if not included on Drawings.

Basis-of-Design Product: Subject to compliance with requirements, provide Ace Minipack or prior approved equal. All requests for prior approval must list all exceptions to the specification. There will be no change orders allowed for any design modifications at any time during the term of this contract due to use of anything except scheduled equipment. It will ultimately be the installing contractor’s responsibility should any non-conformance issues arise. Contractor to take full responsibility for any changes necessary to accommodate any heater manufacturer not scheduled including but not limited to operating weight, footprint, service clearances, power requirements, or piping.

Description: Packaged semi-instantaneous hot-water heat-exchanger; circulator; controls; and specialties for heating domestic water with <**steam**> in coil. All components shall be mounted, piped and wired at the factory.

Flow Pattern: Standard-flow arrangement, with water from bottom of the vessel circulated across heat-exchanger coil and returned to vessel. Include hot-water outlet located at top of the vessel and temperature sensor in the vessel.

Shell Construction: ASME-code 316L stainless steelwith <**150-psig or 250-psig**>working-pressure rating. Include nozzle and head for heat-exchanger tube coil.

Configuration: <**Vertical or Horizontal**>.

Capacity: less than 10 gallon capacity

Tapings: Factory fabricated of materials compatible with the vessel. Attach tapings to the vessel before testing and labeling.

NPS 2” and Smaller: Threaded ends according to ASME B1.20.1.

NPS 2 1/2” and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges.

Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire vessel except connections and controls.

Jacket Finish: 24 gauge stainless steel mirror finish.

U-Tube Heat-Exchanger Coil: Seamless double wall vented tubing. <**Cupro-Nickel (SB111) / Copper (SB75)>** inner and outer 5/8" O.D. x 0.040" inside wall expanded into solid SA516-70 carbon steel tube sheet , 3/4" O.D. x 0.040" outside wall expanded into solid SA240-304 stainless steel tube sheet, 3/8" gap between tube sheets for tube leak detection. Bolting consists of alloy steel studs, SA193-B7, with alloy steel nuts, SA194-2H. Gaskets of permanite fluoroseal expanded Teflon (PTFE). Independent bolting design so that either gasket may be examined and replaced independently.

Control Valve: Heater shall be equipped with **<electronically / pilot / pneumatic >** operated **<2-way steam control valve>.**

Temperature Control: Heater shall maintain +/- 4 oF Max temperature fluctuation from temperature set point under normal load conditions

Control Panel: **<Electronic PID controller with digital display mounted in a panel / 6"x6"x4" factory wired to include power switch and indicating lights as follows: Power on = Green, High Temperature = Red. Installer to bring 120 Vac from circuit breaker, per local codes.>**

Safety Control: Automatic, high-temperature-limit cutoff device or system.

Relief Valves: ASME rated and stamped for**<temperature & pressure / pressure>** relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than or equal to the maximum working-pressure rating of the heat exchanger.

 Strainer: Y-Type 250# cast iron strainer, piped to the valve. Manufactured with stainless steel perforatered. Equipped with a 1/2" drain plug.

Vacuum Breaker: **<Brass / Stainless Steel>**, 300# construction, threaded into bonnet.

Gages: Factory-panel mounted.

Circulating Pump: UL List, all-bronze, fractional horsepower, in-line pump. Include copper piping with bronze pump isolation valves.

Support: Factory mounted on **<vertical skids / horizontal rack>.**

* + - 1. SOURCE QUALITY CONTROL

Retain first paragraph below for factory-assembled, domestic-water heat exchangers. Factory tests are an added cost option and may not be available from some manufacturers. Verify requirement with Owner.

* + - * 1. Factory Tests: Test and inspect domestic-water heat exchangers specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
				2. Hydrostatically test domestic-water heat exchangers to minimum of one point three times pressure rating before shipment.
				3. Domestic-water heat exchangers will be considered defective if they do not pass tests and inspections. Comply with requirements in Division 01 Section "Quality Requirements" for retesting and re-inspecting requirements and Division 01 Section "Execution" for requirements for correcting the Work.
				4. Prepare test and inspection reports.
1. EXECUTION
	* + 1. DOMESTIC-WATER, U-TUBE HEAT-EXCHANGER INSTALLATION
				1. Install domestic-water heat exchangers level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

Install shutoff valves on domestic-water-supply piping to heat exchangers and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

Install shutoff valves on heating hot-water piping to heat exchangers. Comply with requirements for shutoff valves specified in Division 23 Section "General-Duty Valves for HVAC Piping."

Install shutoff valves on steam and condensate piping to heat exchangers. Comply with requirements for shutoff valves specified in Division 23 Section "General-Duty Valves for HVAC Piping."

* + - * 1. Install relief valves in top portion of the shell of the domestic-water heat exchangers. Extend relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
				2. Install heat-exchanger drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heat exchangers that do not have tank drains. Comply with requirements for hose-end drain valves specified in Division 22 Section "Domestic Water Piping Specialties."
				3. Install thermometer on each domestic-water, heat-exchanger, [**inlet and**] outlet piping, and install thermometer on each domestic-water, heat-exchanger, heating-fluid [**inlet and**] outlet piping. Comply with requirements for thermometers specified in Division 22 Section "Meters and Gages for Plumbing Piping."
				4. Install pressure gages on domestic-water, heat-exchanger, heating-fluid piping. Comply with requirements for pressure gages specified in Division 22 Section "Meters and Gages for Plumbing Piping."
				5. Fill domestic-water heat exchangers with water.
			1. CONNECTIONS

Coordinate piping installations and specialty arrangements with schematics on Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.

* + - * 1. Comply with requirements for piping specified in Division 22 Section "Domestic Water Piping."
				2. Comply with requirements for heating hot-water piping specified in Division 23 Section "Hydronic Piping."
				3. Comply with requirements for steam and condensate piping specified in Division 23 Section "Steam and Condensate Heating Piping."
				4. Drawings indicate general arrangement of piping, fittings, and specialties.
				5. Where installing piping adjacent to domestic-water heat exchangers, allow space for service and maintenance of heat exchangers. Arrange piping for easy removal of domestic-water heat exchangers.
			1. IDENTIFICATION
				1. Identify system components. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."
			2. FIELD QUALITY CONTROL
				1. Perform tests and inspections.

Retain first subparagraph below to require a factory-authorized service representative to assist Contractor with inspections, tests, and adjustments.

Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.

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

* + - * 1. Domestic-water heat exchangers will be considered defective if they do not pass tests and inspections. Comply with requirements in Division 01 Section "Quality Requirements" for retesting and re-inspecting requirements and Division 01 Section "Execution" for requirements for correcting the Work.
				2. Prepare test and inspection reports.
			1. DEMONSTRATION
				1. Train Owner's maintenance personnel to adjust, operate, and maintain boilers. Refer to Division 1 Section "Demonstration and Training."