**Laars Heating Systems Company – U.H.E. Series**

SECTION 223400 - FUEL-FIRED, DOMESTIC-WATER HEATERS

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 commercial, gas-fired, storage, domestic-water heaters.
       3. ACTION SUBMITTALS
          1. Product Data: For each type of product, include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
          2. Sustainable Design Submittals:

Product Data for water heater compliance with ASHRAE's "Advanced Energy Design Guides."

* + - * 1. Shop Drawings: Include diagrams for power, signal, and control wiring.
      1. INFORMATIONAL SUBMITTALS
         1. Coordination Drawings: Equipment room drawing or BIM model, drawn to scale, on which the items described in this Section are shown and coordinated with all building trades.
         2. Product Certificates: For each type of commercial, gas-fired, domestic-water heater.
         3. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.
         4. Source quality-control reports.
         5. Field quality-control reports.
         6. Warranty: Standard warranty, shown below.
      2. CLOSEOUT SUBMITTALS
         1. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include in emergency, operation, and maintenance manuals.
      3. COORDINATION
         1. Coordinate sizes and locations of concrete bases with actual equipment provided.
      4. WARRANTY
         1. Manufacturer’s Warranty: Manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period. Where “prorated” is indicated, the heater manufacturer will cover the indicated percentage of cost or replacement parts. With “prorated” type, covered cost decreases as age of equipment increases.

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

Structural failures.

Faulty operation of controls.

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

Warranty Periods: Limited warranty is effective as of the date of installation or 6 months after the date of manufacture, whichever is first.

Heat Exchanger Failure: 3 years.

Controls and Other components: 1 year.

1. PRODUCTS
   * + 1. PERFORMANCE REQUIREMENTS
          1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and use.
          2. ASHRAE/IES Compliance: Comply with efficiency requirements in ASHRAE 189.1, which supersede requirements in ASHRAE/IES 90.1.
          3. ASME Compliance: Option for construction in accordance with ASME Boiler and Pressure Vessel Code, and labeled with ASME HLW stamp.
          4. AHRI: Heater thermal efficiencies shall be determined and listed by AHRI.
          5. CSA Compliance: Test heaters for compliance with the latest edition of ANSI Z21.10.3/CSA 4.3 for gas water heaters.
       2. COMMERCIAL, WATER TUBE TYPE, GAS-FIRED, DOMESTIC-WATER HEATERS
          1. Basis-of-Design Product: Subject to compliance with requirements, provide Laars Heating Systems Company U.H.E. Series commercial, gas-fired, high-efficiency, storage, domestic-water heater, or comparable product by one of the following:

Raypak, Inc.

RBI; A Division of Mestek, Inc.

Thermal Solutions LLC.

Lochinvar, LLC.

* + - * 1. Source Limitations: Obtain domestic water heaters from single source from single manufacturer.
        2. Standard: ANSI Z21.10.3/CSA 4.3.
        3. Construction:

Heat Exchanger: Three-pass system, enabling high turbulence and velocity for high heat transfer to water.

Burner: Low-NOx, down-fired, pre-mix burner, integral to heater, available for natural or propane fuel.

Temperature control: Integrated electronic temperature, ignition & safety control, with LCD display.

Ignition: Direct spark.

Safety Controls: Automatic high temperature limit.

Pressure Relief: Combination temperature and pressure relief valve, per ANSI Z21.22/CSA 4.4.

Tank lining: Enamel glass, fused to the steel surface by firing at a temperature over 1600 deg F (871 deg C).

Insulation: Non-CFC foam insulation that complies with ASHRAE/IES 90.1. Surround entire storage tank except connections and controls.

Jacket: Steel with thermal set powder coat finish.

Tappings: 1-½” NPT, factory fabricated of materials compatible with tank. Attach tappings to tank before testing.

* + - * 1. Factory-Installed Appurtenances and Features:

Modulation: 3:1 turn down ratio. (120 gallon models).

BMS Integration: Modbus standard, BACnet compatible via gateway kit.

Energy Star Qualified.

Sanitizing Capability: 180 deg F (82 deg C).

Anode Rod: Multiple powered anodes.

Drain valve: Corrosion resistant metal with hose end connection.

Exhaust pressure switch.

Zero-inch clearance for combustibles.

Hand hole cleanout.

Sediment reducing cold water inlet tube.

Dielectric fittings.

1” NPT side connections for space heating.

* + - * 1. Options - Heater Mounted:

ASME HLW construction with 150 psig (1035 kPa) working pressure rating.

* + - * 1. Options - Field Installed:

BACnet gateway kit.

Condensate neutralizer kit.

Concentric vent terminal.

Low-profile concentric vent terminal.

NSF compliance kit.

* + - * 1. Capacity and Characteristics:

Storage Capacity:

LUHE60: 60 gallons (227 liters).

LUHE100: 100 gallons (379 liters).

LUHE120: 119 gallons (450 liters).

Recovery:

LUHE60T125: 145 gph (0.15 L/s) at 100°F (56°C) temperature rise.

LUHE60T150: 168 gph (0.18 L/s) at 100°F (56°C) temperature rise.

LUHE60T199: 223 gph (0.23 L/s) at 100°F (56°C) temperature rise.

LUHE100T150: 180 gph (0.19 L/s) at 100°F (56°C) temperature rise.

LUHE100T199: 239 gph (0.25 L/s) at 100°F (56°C) temperature rise.

LUHE100T250: 294 gph (0.31 L/s) at 100°F (56°C) temperature rise.

LUHE100T300: 335 gph (0.35 L/s) at 100°F (56°C) temperature rise.

LUHE120T400: 456 gph (0.48 L/s) at 100°F (56°C) temperature rise.

LUHE120T500: 568 gph (0.57 L/s) at 100°F (56°C) temperature rise.

Fuel Gas Input:

LUHE60T125: 125 Mbh (36.6 kW)

LUHE60T150: 150 Mbh (43.9 kW)

LUHE60T199: 199.9 Mbh (58.6 kW)

LUHE100T150: 150 Mbh (43.9 kW)

LUHE100T199: 199.9 Mbh (58.6 kW)

LUHE100T250: 250 Mbh (73.3 kW)

LUHE100T300: 300 Mbh (87.9 kW)

LUHE120T400: 399.9 Mbh (117.2 kW)

LUHE120T500: 499.9 Mbh (146.2 kW)

Inlet Gas Pressure: 4 - to 14 in. wg (995 to 3484 Pa).

AHRI Certified Thermal Efficiency:

LUHE60T125: 96 percent.

LUHE60T150: 93 percent.

LUHE60T199: 92 percent.

LUHE100T150: 97 percent.

LUHE100T199: 97 percent.

LUHE100T250: 96 percent.

LUHE100T300: 92 percent.

LUHE120T400: 94 percent.

LUHE120T500: 94 percent.

Voltage: 120-V ac, single phase, 60 Hz.

* + - * 1. Duct Connections:

Heater Intake and Exhaust Vent Piping. Intake air may be taen from the room, or ducted to the heater:

With room air, vent pipe may be:

LUHE60T125:

Up to 30 equivalent feet of 2 inch pipe.

Up to 120 equivalent feet of 3 inch pipe.

Up to 170 equivalent feet of 4 or 6 inch pipe.

LUHE60T150:

Up to 30 equivalent feet of 2 inch pipe.

Up to 100 equivalent feet of 3 inch pipe.

Up to 150 equivalent feet of 4 or 6 inch pipe.

LUHE60T199:

Up to 30 equivalent feet of 2 inch pipe.

Up to 80 equivalent feet of 3 inch pipe.

Up to 130 equivalent feet of 4 inch pipe.

LUHE100T150:

Up to 30 equivalent feet of 2 inch pipe.

Up to 120 equivalent feet of 3 inch pipe.

Up to 170 equivalent feet of 4 or 6 inch pipe.

LUHE100T199:

Up to 30 equivalent feet of 2 inch pipe.

Up to 100 equivalent feet of 3 inch pipe.

Up to 150 equivalent feet of 4 inch pipe.

LUHE100T250:

Up to 80 equivalent feet of 3 inch pipe.

Up to 150 equivalent feet of 4 inch pipe.

LUHE100T300:

Up to 60 equivalent feet of 3 inch pipe.

Up to 110 equivalent feet of 4 inch pipe.

Up to 120 equivalent feet of 6 inch pipe.

LUHE120T400:

Up to 65 equivalent feet of 3 inch pipe.

Upt to 100 equivalent feet of 4 inch pipe.

Up to 120 equivalent feet of 6 inch pipe.

LUHE120T500:

Up to 65 equivalent feet of 3 inch pipe.

Up to 100 equivalent feet of 4 inch pipe.

Up to 120 equivalent feet of 6 inch pipe.

When ducting combustion air, air & vent pipes may be:

LUHE60T125:

Up to 15 equivalent feet of 2 inch pipe.

Up to 60 equivalent feet of 3 inch pipe.

Up to 85 equivalent feet of 4 or 6 inch pipe.

LUHE60T150:

Up to 15 equivalent feet of 2 inch pipe.

Up to 50 equivalent feet of 3 inch pipe.

Up to 75 equivalent feet of 4 or 6 inch pipe.

LUHE60T199:

Up to 15 equivalent feet of 2 inch pipe.

Up to 40 equivalent feet of 3 inch pipe.

Up to 65 equivalent feet of 4 inch pipe.

LUHE100T150:

Up to 15 equivalent feet of 2 inch pipe.

Up to 50 equivalent feet of 3 inch pipe.

Up to 85 equivalent feet of 4 or 6 inch pipe.

LUHE100T199:

Up to 15 equivalent feet of 2 inch pipe.

Up to 50 equivalent feet of 3 inch pipe.

Up to 75 equivalent feet of 4 inch pipe.

LUHE100T250:

Up to 40 equivalent feet of 3 inch pipe.

Up to 65 equivalent feet of 4 inch pipe.

LUHE100T300:

Up to 30 equivalent feet of 3 inch pipe.

Up to 55 equivalent feet of 4 inch pipe.

Up to 60 equivalent feet of 6 inch pipe.

LUHE120T400:

Up to 65 equivalent feet of 3 inch pipe.

Upt to 100 equivalent feet of 4 inch pipe.

Up to 120 equivalent feet of 6 inch pipe.

LUHE120T500:

Up to 65 equivalent feet of 3 inch pipe.

Up to 100 equivalent feet of 4 inch pipe.

Up to 120 equivalent feet of 6 inch pipe.

In the U.S., vent pipe may be PVC DWV (ASTM D-2665), PVC Sch. 40 (ASTM-D1785), CPVC Sch. 40 (ASTM-F441, ASTM-D2846), PVC and CPVC (UL 1738), ABS Sch. 40 DWV (ASTM-D2261), Polypropylene (UL 1738), or stainless steel (UL 1738). In Canada, vent pipe must comply with CAN/CGA B149.1 (latest edition) and be certified to ULC S636.

Comply with all heater manufacturer’s installation instructions.

* + - 1. SOURCE QUALITY CONTROL
         1. Factory Tests: Test and inspect assembled domestic-water heaters specified to be ASME-code construction, in accordance with ASME Boiler and Pressure Vessel Code.
         2. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.
         3. Domestic-water heaters will be considered defective if they do not pass tests and inspections.
         4. Assembled heater must be factory tested for safety and functionality; heater filled with water, fired throughout firing range, with all burner safety components proven. Results recorded for future reference.
         5. Prepare test and inspection reports.

1. EXECUTION
   * + 1. DOMESTIC-WATER HEATER INSTALLATION
          1. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on concrete base. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."
          2. Install domestic-water heaters level and plumb, in accordance with layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
          3. Install gas-fired, domestic-water heaters in accordance with NFPA 54.
          4. Assemble and install any additional or optional heater trim.
          5. Fill domestic-water heaters with water.
          6. Charge domestic-water expansion tanks with air to required system pressure.
       2. PIPING CONNECTIONS
          1. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."
          2. Comply with requirements for gas piping specified in Section 231123 "Facility Natural-Gas Piping."
          3. Drawings indicate general arrangement of piping, fittings, and specialties.
          4. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.
       3. IDENTIFICATION
          1. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."
       4. FIELD QUALITY CONTROL
          1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
          2. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
          3. Perform tests and inspections in accordance with manufacturer’s written instructions..
          4. Tests and Inspections:

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 heaters will be considered defective if they do not pass tests and inspections.
        2. Prepare test and inspection reports.
      1. DEMONSTRATION
         1. Train owner's maintenance personnel to adjust, operate, and maintain the domestic-water heaters.

**END OF SECTION 223400**