**Laars Heating Systems Company – Mighty Therm2 Models MT2V 500-2000**

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, finned-tube, gas-fired, 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 Due to Thermal Shock: 25 years.

Heat Exchanger Failure Due to Other Than Thermal Shock: Ten years, with years 6 to 10 prorated.

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: Constructed 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 Mighty Therm2 MT2V, water tube type, gas-fired, 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. Description: Packaged commercial, finned-tube, gas-fired, domestic-water heater and controls.
        2. Heater Construction: ASME code with 160-psig (1100-kPa) working-pressure rating for commercial domestic-water heater.
        3. Heater Appurtenances:

Heat Exchanger: Horizontal, straight, finned-copper tubes with glass-lined cast-iron headers.

Combustion Chamber: Interlocking panels of refractory insulation, high-temperature cements, mineral fiber, and ceramic refractory tile for service temperatures of up to 2,000 deg F (1100 deg C).

Burner: Multiple stainless steel burners, suitable for natural or propane gas.

Blower: Factory-mounted centrifugal fan to draw outside air into heater and discharge flue gases into heater vent.

Gas Train: Multiple combination gas valves with manual shutoff per CSA requirements.

Ignition: ANSI Z21.10.3/CSA 4.3, proven hot surface ignition.

Jacket: Sheet metal with snap-in, mechanically fastened, and/or interlocking closures, with powder coat, thermal set textured finish.

Built and CSA certified for indoor or outdoor installations.

CSA certified for category I fan-assisted, and category III vent systems.

Controls:

CSA certified.

Temperature control with adjustable set point.

Manual reset high limit.

Pump time delay.

Two-stage firing.

External control cnnections with selector switch.

Sequence of operation: Call for heat, prepurge, ignitor warmup, ignitor prove, main gas ignition, main gas proof, end of call for heat, post purge.

Water flow switch.

Pressure relief valve: 125 psig (861 kPa).

Pressure and Temperature Gage: Minimum 3-1/2-inch- (89-mm-) diameter, combination water-pressure and -temperature gage, in compliance with ASME pressure vessel code.

Burner site glass.

Blocked vent safety pressure switch.

On/off toggle switch.

Air filter.

* + - * 1. Options - Heater Mounted:

Alarm bell with silence switch.

Mounted/wired heater pump.

Cupronickel heat exchanger tubes.

Bronze trim.

ASME HLW construction.

Low water cutoff with manual reset and test button.

Automatic reset high limit.

Reversed water connections.

Alternate relief valves.

* + - * 1. Options - Field Installed:

Side-wall vent terminal.

Side-wall combustion air terminal.

Vent terminal for unit placed outdoors.

Air terminal for unit placed outdoors.

* + - * 1. Support: Steel base or skids.
        2. Capacity and Characteristics:

Recovery:

Model 500: 510 gph (0.54 L/s) at 100°F (56°C) temperature rise.

Model 750: 766 gph (0.81 L/s) at 100°F (56°C) temperature rise.

Model 1000: 1019 gph (1.07 L/s) at 100°F (56°C) temperature rise.

Model 1250: 1276 gph (1.34 L/s) at 100°F (56°C) temperature rise.

Model 1500: 1531 gph (1.61 L/s) at 100°F (56°C) temperature rise.

Model 1750: 1786 gph (1.88 L/s) at 100°F (56°C) temperature rise.

Model 2000: 2040 gph (2.15 L/s) at 100°F (56°C) temperature rise.

Fuel Gas Input:

Model 500: 500 Mbh (147 kW).

Model 750: 750 Mbh (220 kW).

Model 1000: 999 Mbh (293 kW).

Model 1250: 1,250 Mbh (366 kW).

Model 1500: 1,500 Mbh (439 kW).

Model 1750: 1,750 Mbh (513 kW).

Model 2000: 2000 Mbh (586 kW).

Inlet Gas Pressure: 4- to 13 in. wg (995 to 3235 Pa).

AHRI Certified Thermal Efficiency: 85.0 percent.

Available Voltages:

120-V ac, single phase, 60 Hz.

* + - * 1. Heater Intake and Exhaust Vent Piping: Install flue-venting kit and combustion-air intake.

For heaters placed indoors:

Intake air may be taken from the room, or ducted to the heater with up to 50 feet of, and up to three elbows. Air pipe material may be single-wall galvanized steel, 24 gauge minimum, insulated or non-insulated, sealed with permanent duct tape or aluminum tape. Air pipe diameter may be:

Model 500: 6 inch.

Model 750: 8 inch.

Model 1000: 8 inch.

Model 1250: 12 inch.

Model 1500: 12 inch.

Model 1750: 12 inch.

Model 2000: 12 inch.

Exhaust vent may be Category III or fan-assisted Category I.

Category III vent may be up to 50 feet of pipe, and up to three elbows. Vent pipe material must comply with UL Standard UL1738, such as type 29-4C stainless steel, either insulated or non-insulated. Vent pipe diameter may be:

Model 500: 6 inch.

Model 750: 8 inch.

Model 1000: 8 inch.

Model 1250: 10 inch.

Model 1500: 10 inch.

Model 1750: 12 inch.

Model 2000: 12 inch.

Category I vent must be sized to achieve negative draft. The vent system must conform to the National Fuel Gas Code (ANSI Z223.1-Latest edition) in the U.S., or to CSA B149.1 (latest edition) in Canada. It must be sized as a fan-assisted Category I system.

For boilers placed outdoors, use air intake and exhaust vent accessories from boiler manufacturer.

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**