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| **Typical Specification** |
| **AWN-SPEC-10** |



**Typical** **Specification** **for Lochinvar®** **Armor Water Heater**

***Models******150,000******-******285,000******Btu/Hr***

The **WATER HEATER** shall be a **LOCHINVAR ARMOR** Model **AW(N,L)\_\_\_\_\_\_\_\_\_\_PM** having a modulating input rating of \_\_\_\_\_\_\_\_\_ Btu/Hr, a recovery capacity of **\_\_\_\_\_\_\_\_\_** gallons per hour at a 100oF rise and shall be operated on (Natural Gas) (LP Gas). The **WATER HEATER** shall be capable of full modulation firing down to 20% of rated input with a turn down ratio of 5:1.

The **WATER HEATER** shall bear the ASME "HLW" stamp and shall be National Board listed for inputs in excess of 200,000 Btu/Hr. There shall be no banding material, bolts, gaskets or "O" rings in the header configuration. The stainless steel combustion chamber shall be designed to drain condensation to the bottom of the heat exchanger assembly. A built-in trap shall allow condensation to drain from the heat exchanger assembly. The complete heat exchanger assembly shall carry a five (5) year limited warranty.

The **WATER HEATER** shall be certified and listed by C.S.A. International under the latest edition of the harmonized ANSI Z21.10.3 test standard for the US and Canada The **WATER HEATER** shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard. The **WATER HEATER** shall be 96% thermal efficiency. The **WATER HEATER** shall be certified for indoor installation.

The **WATER HEATER** shall be constructed with a heavy gauge steel jacket assembly, primed and pre-painted on both sides. The combustion chamber shall be sealed and completely enclosed, independent of the outer jacket assembly, so that integrity of the outer jacket does not affect a proper seal. A burner/flame observation port shall be provided. The burner shall be a premix design and constructed of high temperature stainless steel with a woven metal fiber outer covering to provide modulating firing rates. The **WATER HEATER** shall be supplied with a gas valve designed with negative pressure regulation and be equipped with a variable speed blower system, to precisely control the fuel/air mixture to provide modulating **WATER HEATER** firing rates for maximum efficiency. The **WATER HEATER** shall operate in a safe condition at a derated output with gas supply pressures as low as 4 inches of water column.

The **WATER HEATER** shall utilize a 24 VAC control circuit and components. The control system shall have an electronic display for water heater set-up, water heater status, and water heater diagnostics. All components shall be easily accessed and serviceable from the front and top of the jacket. The **WATER HEATER** shall be equipped with; a high limit temperature control certified to UL353, ASME certified pressure relief valve, outlet water temperature sensor, inlet water temperature sensor, a UL 353 certified flue temperature sensor, low water flow protection and built-in freeze protection. The manufacturer shall verify proper operation of the burner, all controls and the heat exchanger by connection to water and venting for a factory fire test prior to shipping.

A **CIRCULATING PUMP** is required to deliver specified flow rates through the heat exchanger. A properly sized stainless steel PUMP is supplied with the standard “Pump Mounted” (PM) model. Upsized PUMPS are an available option for increased flow and better lime scale protection in hard water conditions. Factory supplied PUMPS shall operate on a 120 volt, 60 cycle, 1 phase power supply (unless otherwise specified). No PUMP models are also available.

The **WATER HEATER** shall feature the “Smart System” control with a Multi-Colored Graphic LCD display with Navigation Dial and Soft Keys, password security, pump delay with freeze protection, pump exercise, and USB PC port connection. The **WATER HEATER** shall feature night setback for the domestic hot water tank and shall be capable of controlling a building recirculation pump while utilizing the night setback schedule for the building recirculation pump. The **WATER HEATER** shall have the capability to accept a 0-10 VDC input connection for BMS control of modulation or setpoint and enable/disable of the water heater, and a 0-10VDC output of water heater modulation rate. The **WATER HEATER** shall have a built-in cascading sequencer with modulation logic options of “lead lag” or “efficiency optimized”. Both modulation logic options should be capable of rotation while maintaining modulation of up to eight water heaters without utilization of an external controller. Supply voltage shall be 120 volt / 60 hertz / single phase.

The **WATER HEATER** shall be equipped with two terminal strips for electrical connection. A low voltage connection board with data points for safety and operating controls, i.e., Auxiliary Relay, Auxiliary Proving Switch, Alarm Contacts, Runtime Contacts, Manual Reset Low Water Cutoff, Flow Switch, High and Low Gas Pressure Switches, Tank Thermostat, Tank Sensor, Building Management System Signal, Modbus Control Contacts and Cascade Control Circuit. A high voltage terminal strip shall be provided for supply voltage. The high voltage terminal strip plus integral relays are provided for independent control of the Domestic Hot Water Pump and Building Re-circulation Pump.

The **WATER HEATER** shall be installed and vented with a (select one):

**(a) Direct Vent** **Sidewall** system with a horizontal sidewall termination of both the vent and combustion air. The flue shall be PVC, CPVC or Stainless Steel sealed vent material terminating at the sidewall with the manufacturers specified vent termination. A separate pipe shall supply combustion air directly to the **WATER HEATER** from the outside. The air inlet pipe may be PVC, CPVC, ABS, Galvanized, Dryer Vent, or Stainless Steel sealed pipe. The air inlet must terminate on the same sidewall with the manufacturer’s specified air inlet cap. The **WATER HEATER’s** total combined air intake length shall not exceed 100 equivalent feet. The **WATER HEATER’s** total combined exhaust venting length shall not exceed 100 equivalent feet. ***Foam Core pipe is not an approved material for exhaust piping.***

**(b) Direct Vent Vertical** system with a vertical roof top termination of both the vent and combustion air. The flue shall be PVC, CPVC or Stainless Steel sealed vent material terminating at the roof top with the manufacturers specified vent termination. A separate pipe shall supply combustion air directly to the **WATER HEATER** from the outside. The air inlet pipe may be PVC, CPVC, ABS, Galvanized, Dryer Vent, or Stainless Steel sealed pipe. The air inlet must terminate on the roof top with the manufacturer’s specified air inlet cap. The **WATER HEATER’s** total combined air intake length shall not exceed 100 equivalent feet. The **WATER HEATER’s** total combined exhaust venting length shall not exceed 100 equivalent feet. ***Foam Core pipe is not an approved material for exhaust piping.***

**(c) Sidewall Vent with Room Air** system with a horizontal sidewall termination of the vent with the combustion air drawn from the interior if the building. The flue shall be PVC, CPVC or Stainless Steel sealed vent material terminating at the sidewall with the manufacturers specified vent termination. The **WATER HEATER’s** total combined exhaust venting length shall not exceed 100 equivalent feet. ***Foam Core pipe is not an approved material for exhaust piping.***

**(d) Vertical Vent with Room Air**system with a vertical rooftop termination of the vent with the combustion air drawn from the interior of the building. The flue shall be PVC, CPVC or Stainless Steel sealed vent material terminating at the rooftop with the manufacturers specified vent termination. The **WATER HEATER’s** total combined exhaust venting length shall not exceed 100 equivalent feet. ***Foam Core pipe is not an approved material for exhaust piping.***

**(e) Vertical Vent with Sidewall Air** system with a vertical rooftop termination of the vent with the combustion air being drawn horizontally from a sidewall. The flue shall be PVC, CPVC, or Stainless Steel sealed vent material terminating at the roof top with the manufacturers specified vent termination. A separate pipe shall supply combustion air directly to the **Water Heater** from the outside. The air inlet may be PVC, CPVC, ABS, Galvanized, Dryer Vent, or Stainless Steel sealed pipe. The air inlet must terminate on a sidewall using the manufacturers specified air inlet cap. The **WATER HEATER’s** total combined air intake length shall not exceed 100 equivalent feet. The **WATER HEATER’s** total combined exhaust venting length shall not exceed 100 equivalent feet. ***Foam Core pipe is not an approved material for exhaust piping.***

The **WATER HEATER** shall have an independent laboratory rating for Oxides of Nitrogen (NOx) of 20 ppm or less, corrected to 3% O2.

The **WATER HEATER** shall operate at altitudes up to 4,500 feet above sea level without additional parts or adjustments.

Maximum unit dimensions shall be: Length \_\_\_\_\_\_\_\_inches, Width \_\_\_\_\_\_\_\_inches and Height \_\_\_\_\_\_\_\_\_\_ inches. Maximum unit weight shall be\_\_\_\_\_\_\_\_\_pounds.

The **WATER HEATER’s** firing control system shall be \_\_\_\_\_\_\_\_\_\_\_ (Options Below)

**M9 Direct Spark Ignition with Electronic Supervision**

**FOR PACKAGE SYSTEMS, ADD THE FOLLOWING:**

The domestic hot water supply shall be provided by a **LOCHINVAR ARMOR PACKAGED WATER HEATING SYSTEM** Model\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The package system shall consist of an **Armor** **Water Heater**, a jacketed and insulated Lock‑Temp Storage Tank, a stainless steel circulating pump, inlet and outlet ball valves and an ASME temperature and pressure relief valve. Entire assembly shall be pre‑piped, assembled and skid mounted pressure tested and ready for installation. Components shall be as follows:

The **CIRCULATING PUMP** shall be stainless steel or all bronze and operate on a 120 volt, 60 cycle, 1 phase power supply (unless otherwise specified). The pump shall be wired to run with intermittent pump operation.

**STORAGE TANK** – Shall be a (vertical/horizontal) Lochinvar Lock-Temp® “Energy Saver” tank having a storage capacity of \_\_\_\_\_\_\_\_\_\_\_\_\_\_gallons. The tank shall be constructed with an inner chamber designed to receive all circulation to and from the water heater to eliminate turbulence in the tank. The baffled tank shall supply 80% of tank capacity without a drop in outlet temperature.

The **STORAGE TANK** shall be constructed in accordance with (Standard/ASME) requirements, [if ASME, stamped and registered with the National Board of Boiler and Pressure Vessel Inspectors]. The storage tank shall have a working pressure of (125/150) psi. The storage tank shall be glass lined and fired to 1600°F to ensure a molecular fusing of glass and steel, and carry a five (5) year limited warranty. The Lock-Temp Tank shall be constructed with a heavy gauge galvanized steel jacket assembly, primed and pre-painted on both sides. The jacket and tank base shall be a water tight construction with a built-in drain pan, complete with a ¾” drain connection to assist in protecting against damage in the event of a tank or component leakage. The Storage Tank shall be completely encased in high density insulation of sufficient thickness to meet the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard. The entire assembly shall be mounted on 3” channel iron skids to facilitate handling and installation.

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