

<Suggested specification for DURAWATT® electric water heater with AquaPLEX® storage tanks as manufactured by PVI Industries, LLC of Fort Worth, Texas.>

SECTION 15514 - DOMESTIC WATER HEATERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 1 Specification Sections, apply to this section.

1.2 SUMMARY

This section includes electric storage water heaters for potable water.

1.3 REFERENCES

- A. UL 1453 “Electric Booster and Commercial Storage Tank Water Heaters”
- B. ASME Boiler and Pressure vessel code, Section IV, Part HLW
- C. ASHRAE/IES 90.1-2010
- D. ISO 9001 “Quality Management System”
- E. NFPA 70- National Electric Code NSF/ANSI Standard 61- Drinking Water System Components
- F. ASTM G123 - 00(2005) “Standard Test Method for Evaluating Stress-Corrosion Cracking of Stainless Alloys with Different Nickel Content in Boiling Acidified Sodium Chloride Solution.”

1.4 SUBMITTALS

- A. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties and accessories for each model indicated.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, components, and size of each field connection
- C. Wiring Diagrams: Detail for wiring power signal, differentiate between manufacture- installed and field-installed wiring
- D. Maintenance Data: Include in the maintenance manuals specified in Division 1. Include maintenance guide and wiring diagrams

1.5 REGULATORY REQUIREMENTS

- A. Conform to applicable code for internal wiring of factory wired equipment

- B. Units: ETL, UL or CSA Listed as a Complete Electric Water Heater Assembly.
- C. Conform to ASME Section IV. Part HLW for Water Heater construction.

1.6 QUALITY ASSURANCE

- A. Listing: The water heater will be listed ETL listed to UL 1453 “Electric Booster and Commercial Storage Tank Water Heaters”
- B. ASME Compliance: Water heater shall bear the ASME HLW stamp and be National Board listed
- C. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum twenty years’ experience.
- D. Water heater manufacturer certified to ISO 9001 Quality Management System.

1.7 COORDINATION

Coordinate size and location of concrete bases

1.8 WARRANTY

- A. Storage Tank: 25-year (15 years full, 10 years prorated) coverage for manufacturing or material defects, leaks, production of rusty water and/or chloride stress corrosion cracking. Tank warranty does not require inspection and maintenance of anode rods.
- B. The heater shall have a first year service policy, which shall cover labor and freight costs under certain conditions for warranty covered services.

<OPTIONAL> The heater shall have a long-life service policy, which shall cover labor and freight costs under certain conditions for warranty covered services.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Manufacturer shall be a company specializing in manufacturing the products specified in this section with minimum twenty years’ experience. The water heaters shall be manufactured by a company that has achieved certification to the ISO 9001 Quality Management System.
- B. The water heaters shall be ETL listed as a complete unit. The heater shall satisfy current Federal Energy Policy Act standards for both thermal efficiency and stand-by heat losses.
- C. Manufacturers: PVI is the basis of design. Acceptable manufacturers shall be subject to compliance with the requirements.

2.2 CONSTRUCTION

- A. The storage section of the water heater shall be ASME HLW stamped and National Board Registered for a maximum allowable working pressure of 150 psi and pressure tested at 1-1/2 times working pressure.
- B. All tank connections/ fittings shall be nonferrous. Tank shall be equipped with a ball-type drain valve. Tank design will include a manway sized access to the tank interior.
- C. The storage tank shall be an unlined pressure vessel constructed from phase-balanced austenitic and ferritic duplex steel with a chemical structure containing a minimum of 21% chromium to prevent corrosion and mill certified per ASTM A 923 Methods A to ensure that the product is free of detrimental chemical precipitation that affects corrosion resistance. The material selected shall be tested and certified to pass stress chloride cracking test protocols as defined in ISO 3651-2 and ASTM G123 - 00(2005) "Standard Test Method for Evaluating Stress-Corrosion Cracking of Stainless Alloys with Different Nickel Content in Boiling Acidified Sodium Chloride Solution."
- D. Waterside surfaces shall be welded internally utilizing joint designs to minimize volume of weld deposit and heat input. All heat affected zones (HAZ) shall be processed after welding to ensure the HAZ corrosion resistance is consistent with the mill condition base metal chemical composition. Weld procedures (amperage, volts, welding speed, filler metals and shielding gases) utilized shall result in a narrow range of austenite-ferrite microstructure content consistent with phase balanced objectives for welds, HAZ and the base metal.
- E. All internal and external tank surfaces shall undergo full immersion passivation and pickling processing to meet critical temperature, duration and chemical concentration controls required to complete corrosion resistance restoration of pressure vessel surfaces. Other passivation and pickling methods are not accepted. Immersion passivation and pickling certification documents are required and shall be provided with each product.
- F. Materials shall meet ASME Section II material requirements and be accepted by NSF 61 for municipal potable water systems. Storage tank materials shall contain more than 80% post-consumer recycled materials and be 100% recyclable.
- G. Water contacting tank surfaces will be non-porous and exhibit 0% water absorption.
- H. Lined or plated storage tanks will not be acceptable.
- I. Water heaters that require anodes will not be acceptable.
- J. Heating elements will be rated at 9 kW and 40 watts per square inch heat density
<OPTIONAL> Heating element will be rated at 18 kW and 80 watts per square inch heat density
- K. Heating elements will be sheathed in Incoloy. Each element will individually mount to the tank by means of a four-bolt bronze flange over stainless steel studs with an o-ring seal. A fused magnetic contactor will be supplied for each power circuit. Maximum current per circuit will be 50 amps on three-phase units.

2.3 **PERFORMANCE**

Water heater will meet the requirements of ASHRAE 90.1– 2010.

2.4 **WATER HEATER TRIM**

- A. As a minimum, the heater will be equipped with the following:
 - a. electronic low water cutoff
 - b. an *immersion* operating thermostat
 - c. *immersion* temperature limiting device
 - d. an ASME rated temperature and pressure relief valve
 - e. and options as selected on form PV 8130
- B. Operating and safety controls shall meet the requirements of UL
 - < OPTIONAL > Operating and safety controls shall meet the requirements MASS code.
- C. < OPTIONAL > The water heater shall employ an electronic operating control with digital temperature readout. Operator shall be capable of connecting to a building automation system through serial connection using Modbus RTU protocol.
- D. < OPTIONAL > A protocol gateway for BacNet MSTP/IP will be provided
 - < OPTIONAL > A protocol gateway for Lonworks will be provided.
 - < OPTIONAL > A protocol gateway for Modbus TCP/IP will be provided.

PART 3 – EXECUTION

3.1 INSTALLATION

Install water heaters level and plumb in accordance with manufacturers' written instructions and referenced standards.

3.2 FINISHING

The heater will be completely packaged, requiring only hookup for electrical and plumbing. The heater will be insulated with multiple layers of heavy-density fiberglass, jacketed with powder-coated steel panels, and mounted on heavy-duty channel skills. The heater will fit properly in the space provided and installation will conform to all local, state, and national codes.

3.3 START-UP

Start up on the unit will be performed by factory trained and authorized personnel. A copy of the startup report will be provided to the owner.