<Suggested specification for TURBOPOWER® gas 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 gas-fired storage water heaters for potable water.

1.3 REFERENCES

A. UL 795 “Commercial – Industrial Gas Heating Equipment”

B. ASME Boiler and Pressure vessel code, section IV, Part HLW

C. ANSI Z21.10.3/CSA 4.3 “Gas Water Heaters”

D. ASHRAE/IES 90.1

E. ASME CSD-1 “Controls and Safety Devices for Automatically Fired Boilers”

F. NFPA 70- National Electric Code

G. NFPA 54- National Fuel Gas Code

H. NSF/ANSI Standard 61- Drinking Water System Components

I. 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. Field Test Reports: Indicate and interpret test reports for compliance with performance requirements. A copy will be furnished to the owner.

E. 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 Certified as a Complete Gas Fired Water Heater Assemblies.

C. Gas Train shall comply with UL Standard 795

D. 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 795 "Commercial – Industrial Gas Heating Equipment."

B. ASME Compliance: Water heater shall bear the ASME HLW stamp and be National Board listed

C. The water heater shall operate at no less than 83% thermal efficiency when tested to the ANSI Z21.10.3 efficiency standard. Heater shall comply with current ASHRAE 90.1 requirements for thermal efficiency and standby heat loss.

1.7 COORDINATION

Coordinate size and location of concrete bases

1.8 WARRANTY

A. Storage Tank: 25-year coverage (15 years full, 10 years prorated) for manufacturing or material defects, leaks, production of rusty or discolored water and/or chloride stress corrosion cracking.

B. TURBOPOWER Heat exchanger: 10 year coverage for manufacturing or material defects, leaks, and/or the production of rusty water (5-years full and 5-years pro-rated). Full portion of the warranty includes the replacement exchanger, labor and freight.

C. Burner and all heater parts: 1 year

D. 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 (available at additional cost), which shall cover labor and freight costs under certain conditions for warranty covered services for a period of 5 years

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.

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 as established for gas fired water heaters incorporating storage tanks.

C. Service Access: The water heater shall be provided with access covers for easily accessing all serviceable components. All gas train components must be accessible and able to adjust without the removal of cabinet components.

D. Manufacturers: PVI is the basis of design. Acceptable manufacturers shall be subject to compliance with the requirements.

2.2 CONSTRUCTION

A. Water heater will be a fire tube, storage-type design firing natural gas.

<OPTIONAL> Water heater will be a fire tube, storage-type design firing LP gas.

B. 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.

C. 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.

D. 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 923Methods 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 3651-2and 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."

E. 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.

F. 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.

G. 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.

H. Water contacting tank surfaces will be non-porous and exhibit 0% water absorption.

I. Lined or plated storage tanks will not be acceptable.

J. The water heater will not require anode rods and none will be used. Tanks that employ anodes will not be acceptable.

K. The heat exchanger shall be a two-pass, fire tube design with the combustion chamber and all heating surfaces completely water-backed.

L. The fireside of the combustion chamber shall be of boiler-grade steel. The waterside of the combustion chamber shall be non-ferrous composite of copper arc spray sealed with PTFE. The fire tubes shall be solid copper. The heat exchanger shall be field removable from the pressure vessel, allowing 100% access to waterside surfaces.

<OPTIONAL> The combustion chamber shall be fabricated from duplex stainless steel that is pickle-passivated after complete fabrication. The fire tubes shall be solid copper. The heat exchanger shall be field removable from the pressure vessel, allowing 100% access to waterside surfaces.

M. Combustion will be provided by a fan-assisted burner with a gas train meeting UL and FM requirements for the input specified.

<OPTIONAL> Combustion will be provided by a fan-assisted burner with a gas train meeting CSD-1/GE-GAP/MASS requirements for the input specified.

2.3 PERFORMANCE

A. When tested to the ANSI Z21.10.3 thermal efficiency standard, result shall be no less than 83%.

B. Water heater will meet the thermal efficiency and standby loss 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 flame monitoring
   b. an *immersion* operating thermostat
   c. an *immersion* temperature limiting device
   d. an ASME- or AGA-rated temperature and pressure relief valve
   e. and options as selected on form PV 8050

B. Operating and safety controls shall meet the requirements of UL 795 and FM

< OPTIONAL> Operating and safety controls shall meet the requirements of CSD-1/GEGAP and 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 storage and heating sections shall be completely factory packaged on a single skid, requiring only job site hookup to utilities, venting, and plumbing. The heater shall be insulated to ASHRAE 90.1-2010 requirements, jacketed with enameled steel panels, and mounted on heavy-duty channel skids. The heater shall fit properly in the space provided and installation shall 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.