SPECIFICATION FOR COSMOGAS AGUADENS WATER HEATER

1. GENERAL
   * + 1. RELATED DOCUMENTS
          1. Drawings and general provisions of the Contract apply to this Section, including General and Supplementary Conditions and Specification.
       2. SUMMARY
          1. This Section includes packaged, factory-fabricated and assembled, gas-fired, high efficiency condensing water heaters and accessories for generating hot potable water.
       3. SUBMITTALS
          1. Product Data: Include performance data, operating characteristics, furnished specialties and accessories.

Prior to flue vent installation, engineered calculations and drawings must be submitted to Architect/Engineer to thoroughly demonstrate that size and configuration conform to recommended size, length and footprint for each submitted water heater.

* + - * 1. Pressure Drop Curve: Submit pressure drop curve for flows ranging from 0 GPM to maximum value of water heater.
        2. Shop Drawings: For water heaters and accessories, include:

Plans, elevations, sections, details and attachments to other work

Wiring Diagrams for power, signal and control wiring

* + - * 1. Source Quality Control Test Reports: Reports shall be included in submittals.
        2. Field Quality Control Test Reports: Reports shall be included in submittals.
        3. Operation and Maintenance Data: Data to be included in water heater emergency, operation and maintenance manuals.
        4. Warranty: Standard warranty specified in this Section.
        5. Other Informational Submittals.

ASME Stamp Certification and Report: Submit "A," "S," or "PP" stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to water heater.

* + - 1. QUALITY ASSURANCE
         1. ASME Compliance: Condensing water heaters must be constructed in accordance with ASME Water heater and Pressure Vessel Code, Section IV (HLW) Potable Water Heaters.
         2. DOE Compliance: Minimum efficiency shall comply with 10 CFR Part 431, Subpart G.
         3. NOx Emission Standards. When installed and operated in accordance with manufacturer’s instructions, condensing water heaters shall comply with the NOx emission standards outlined in South Coast Air Quality Management District (SCAQMD), Rule 1146.2.
         4. Low Lead Compliance: Condensing water heaters must be third party classified to meet the requirements of ANSI/NSF 372, hence that the weighted average of the wetted surface area in contact with potable water must be no greater than 0.25% lead content.
      2. COORDINATION
         1. Equipment shall be handled, stored and installed in accordance with the manufacturer’s instructions.
      3. WARRANTY
         1. Standard Warranty: Cosmogas distributor shall fit this section with its own warranty terms and conditions.

1. PRODUCTS
   * + 1. MANUFACTURERS
          1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
          2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
          3. Basis-of-Design Product: Subject to compliance with requirements, provide Cosmogas, Model AGUADENS 199T \_\_\_ ; AGUADENS 250T \_\_\_ ; AGUADENS 399T \_\_\_ ; AGUADENS 500T \_\_\_ ; AGUADENS 750 T \_\_\_ ; AGUADENS 1000T \_\_\_;
       2. CONSTRUCTION
          1. General: The water heating plant shall have a total recovery of ­­\_\_\_\_\_\_\_ GPH, (\_\_\_\_\_ GPM) at a \_\_\_\_\_oF temperature rise. Each water heater shall be; ASME Section IV (HLW) coded and stamped and shall consist of a quantity of Water Heaters Model:

\_\_\_ AGUADENS 199T each with an input of 199,5 MBH, output of 189.5 MBH, 230 GPH, (3.8 GPM) at 100 oF rise, when fired with natural gas or propane, turndown ratio up to 4:1)

\_\_\_ AGUADENS 250T each with an input of 250 MBH, output of 237.5 MBH, 288 GPH, (4.8 GPM) at 100 oF rise, when fired with natural gas or propane, turndown ratio up to 5:1)

\_\_\_ AGUADENS 399T each with an input of 399 MBH, output of 379.0 MBH, 459 GPH, (7.7 GPM) at 100 oF rise, when fired with natural gas or propane, turndown ratio up to 8:1)

\_\_\_ AGUADENS 500T each with an input of 500 MBH, output of 485 MBH, 588 GPH, (9.8 GPM) at 100 oF rise, when fired with natural gas or propane, turndown ratio up to 10:1)

\_\_\_ AGUADENS 750T each with an input of 750 MBH, output of 712.5 MBH, 864 GPH, (14.4 GPM) at 100 oF rise, when fired with natural gas or propane, turndown ratio up to 15:1)

\_\_\_ AGUADENS 1000T each with an input of 999 MBH, output of 949 MBH, 1150 GPH, (19.2 GPM) at 100 oF rise, when fired with natural gas or propane, turndown ratio up to 20:1)

* + - * 1. Description: Water heater shall be direct fired, fully condensing, water-tube design. Power burner shall have full modulation. The minimum firing rate at 50,000 BTU/HR input shall be possible. Water heaters that have an input greater than 50,000 BTU/Hr at minimum fire will not be considered equal. Water heater thermal efficiency shall increase with decreasing load (output), while maintaining setpoint. Water heater shall have an operational setpoint capability of 62 ºF to 182 ºF and shall maintain the outlet temperature within an accuracy of +/- 9 oF during load changes of up to 50% rated capacity. Water heater shall be factory-fabricated, factory-assembled and factory-tested, water-tube condensing water heater with heat exchanger sealed pressure-tight, built on a steel base, including a sealed enclosure that acts as combustion-air intake plenum, flue-gas vent, water supply, return, condensate neutralization reservoir with neutralizing media and condensate drain connections, and controls. Each water heater shall have the useful ASME approved temperature/pressure relief valve, with a setting of 125 psig and 210 oF.
        2. Heat Exchanger: The heat exchanger shall be a 316Ti stainless steel heat exchanger assembly with three round water tubes, with a three pass combustion gas flow design. The materials of construction (316Ti stainless steel) provide superior corrosion resistance and performance in domestic hot water applications. The three round water tubes shall be 0.63”, 0.63” and 0.71” OD, with no less than 0.039” wall thickness. The heat exchanger shall be ASME Sect IV (HLW) stamped for a working pressure not less than 160 psig.
        3. The exhaust manifold shall be of corrosion resistant material with the follow diameter flue connection:

Aguadens 199T = 3”; Aguadens 250T = 3”; Aguadens 399T = 4”; Aguadens 500T = 4”; Aguadens 750T = 6”; Aguadens 1000T = 6”.

* + - * 1. Blower. Each modul shall include a variable-speed, DC centrifugal fan to operate during the burner firing sequence and pre-purge the combustion chamber.
        2. Ignition shall be via spark ignition with 100 percent on main burner and electronic flame supervision.
      1. CONTROLS
         1. The water heater shall have an integrated water heating control that is capable of operating the unit and associated accessories including but not limited to the pumps.

The control shall have a display with function buttons. Installer shall have the ability to navigate the menus.

The control shall display the temperatures and water pressure using dedicated seven-segment displays.

* + - * 1. The combustion safeguard/flame monitoring system shall use spark ignition and a rectification-type flame sensor.
        2. The unit shall have native support for RS-485 remote communications.
        3. The controls shall annunciate water heater and sensor status and include comprehensive self-diagnostic capabilities.
        4. The water heater control system shall incorporate the following additional features for enhanced external system interface:

Fault relay for remote fault alarm

0-10V input to control the water heater setpoint

Connection to a water presence sensor

Remote call for heat

* + - * 1. Unit and Plant Status: The control shall provide a quick view of the unit status and plant status.

The unit display shall provide temperature setpoint, water inlet, outlet, exhaust temperature sensors’ values. It shall also provide unit current firing rates. Additional screens shall display unit run hours, and cycle count.

* + - 1. ELECTRICAL POWER
         1. Single-Point Field Power Connection: Factory-installed and factory-wired switches, motor controllers, transformers and other electrical devices shall provide a single-point field power connection to the water heater.
         2. Electrical Characteristics:

Voltage: 120 V

Phase: Single

Frequency: 60 Hz

* + - 1. CONDENSATE
         1. Each water heater shall contain its own built-in condensate neutralizing reservoir with the right quantity of neutralizing media. Each reservoir shall be suitable for no less than 3 months continuous operation at full condensing rate. Reservoir shall be refillable;
         2. Each water heater shall contain its own condensate traps, manufactured from only non-corrosive materials. In order to guarantee flue gasses cannot leak into the mechanical room.
      2. VENTING
         1. The exhaust vent must be UL Listed for use with Category II, and IV appliances and compatible with positive pressure, condensing flue gas service. UL‑ listed vents of PVC, CPVC, PP, or Al 29-4C stainless steel must be used with water heaters.
         2. Combustion-Air Intake: Water heaters shall be capable of drawing combustion air from the outdoors via a metal or PVC duct connected between the water heater and the outdoors.

The minimum ducted combustion air duct size for each water heater is;

Aguadens 199T = 3”; Aguadens 250T = 3”; Aguadens 399T = 4”; Aguadens 500T = 4”; Aguadens 750T = 6”; Aguadens 1000T = 6”.

* + - * 1. Follow guidelines specified in manufacturer’s venting guide.
      1. SOURCE QUALITY CONTROL
         1. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions and carbon monoxide in flue gas, and to achieve combustion efficiency.
         2. Test and inspect factory-assembled water heaters, before shipping, according to ASME Boiler and Pressure Vessel Code.
         3. Allow Owner access to source quality-control testing of water heaters. Notify Architect fourteen days in advance of testing.

1. EXECUTION
   * + 1. EXAMINATION
          1. Before water heater installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations. Examine piping and electrical connections to verify actual locations, sizes and other conditions affecting water heater performance, safety, maintenance and operations.

Final water heater locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

* + - * 1. Examine mechanical spaces for suitable conditions where water heaters will be installed.
        2. Proceed with installation only after unsatisfactory conditions have been corrected.
      1. WATER HEATER INSTALLATION
         1. Install water heaters level on concrete bases.
         2. Install gas-fired water heaters in accordance with

Local, and national codes, laws, regulations, and ordinances.

National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition.

National Electrical Code, ANSI/NFPA 70 - latest edition.

Canada only: CAN/CGA B149 Installation Code and CSA C22.1 CEC Part 1.

Manufacturer’s installation instructions, including required service clearances and venting guidelines.

* + - 1. CONNECTIONS
         1. Install piping adjacent to water heater to permit service and maintenance.
         2. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
         3. Connect gas piping to water heater gas-train inlet with unions. Piping shall be at least full size of gas train connection. Provide a reducer if required.
         4. Connect hot-water piping to supply and return water heater tappings with shutoff valve and union or flange at each connection.
         5. Multiple heaters shall be piped in reverse return or provided with balancing valves on hot water outlet. Each water heater shall have individual isolation valves for servicing and a hot water hose connection for start-up and field testing.
         6. Install piping from safety relief valves to nearest floor drain.
         7. The appliance must be located in an area where leakage of the tank or connections will not result in damage to the area adjacent to the appliance or to lower floors of the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan, adequately drained, be installed under the appliance.
         8. Water heater Venting

Install flue venting kit and combustion-air intake.

Connect venting full size to water heater connections.

* + - * 1. Ground equipment according to national and local codes.
        2. Connect wiring according to national and local codes.
      1. FIELD QUALITY CONTROL
         1. Perform tests and inspections and prepare test reports.

Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies and equipment installations, including connections, and to assist in testing.

* + - * 1. Tests and Inspections

Installation and Startup Test: Perform installation and startup checks according to manufacturer's written instructions.

Leak Test: Perform hydrostatic test. Repair leaks and retest until no leaks exist.

Operational Test: Start units to confirm unit operation. Adjust air-fuel ratio and combustion.

Controls and Safeties: Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

a. Check and adjust initial operating set points and high - and low-limit safety set points of fuel supply, water presence sensor and water temperature.

b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

* + - * 1. Remove and replace malfunctioning units and retest as specified above.
        2. Occupancy Adjustments: When requested within 2 months of date of Substantial Completion, provide on-site assistance adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.