SECTION 22 34 36 – domestic water heaters (natural gas fired)

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. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.
       2. SUMMARY
          1. This section covers providing all labor and materials for the complete first class installation of storage tank type gas fired domestic water heaters indicated and scheduled on Contract Drawings complete with all controls, piping, valves, accessories, testing, start-up and other normal parts that make the systems complete, operable and acceptable to the authorities having jurisdiction.
       3. REFERENCE STANDARDS
          1. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
          2. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
          3. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

2009 Edition of the International Plumbing Code.

2009 Edition of the International Fuel Gas Code.

* + - 1. QUALITY ASSURANCE
         1. Perform Work in accordance with State of Missouri Department of Health Standards.
         2. Water heaters shall be manufactured by a company that has achieved certification to the ISO 9001 International Quality System.
         3. Provide equipment with manufacturer's name, model number, and rating/capacity permanently identified.
         4. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:

National Sanitation Foundation.

American Society of Mechanical Engineers (ASME stamped - 225 psi test pressure)

National Board Registered for 150 psi working pressure.

National Electrical Manufacturers' Association.

Underwriters Laboratories. UL / ULC listed to safety standard UL 795 "Commercial-Industrial Gas Heating Equipment". UL listed for use with CPVC venting material.

ASHRAE 90.1 compliant for thermal efficiency, and standby heat and electrical loss.

Factory Mutual compliant.

* + - 1. SUBMITTALS
         1. Product Data:

Include dimension Drawings of water heaters indicating piping, components and required connections.

Manufacturer's data sheets and Installation Instructions.

Provide wiring diagrams, electrical characteristics and connection requirements

Provide complete copy of all warranties and service policies, including all exclusions and conditions, as part of the submittal package.

* + - * 1. Record Documents:

Provide full written description of manufacturer’s warranty.

Provide emissions levels certification by independent agency.

Provide at least two copies of equipment startup report.

Shop Drawings:

Include heater dimensions, capacities, location and size of tappings, drains, anchors, lifting points and attachments.

Provide manufacturer’s recommended piping arrangement diagram.

* + - * 1. Operation and Maintenance Data:

Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

* + - 1. DELIVERY, STORAGE and HANDLING
         1. Provide temporary inlet and outlet caps. Maintain caps in place until installation.
         2. Do not operate the hot water heater for any reason until the factory startup service has been completed.
      2. Warranty:
         1. The burner and all heater parts shall have a one-year cost-free service policy warranty. Storage tank, heating surfaces, and combustion chamber shall have a ten-year warranty covering manufacturing or material defects, leaks, and/or the production of rusty water. Tank and heating surfaces shall have a three-year warranty against failure due to scale buildup with no provisions for periodic cleaning. Initiation and /or continuation of warranty coverage shall not be dependent upon annual inspections, regular replacement of anode rods, or water chemistry.

1. PRODUCTS
   * + 1. GENERAL
          1. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.
       2. STORAGE TANK TYPE DOMESTIC HOT WATER HEATER (NATURAL GAS FIRED)
          1. Acceptable Manufacturers:

A.O. Smith Corporation

State

Rheem

Lochinvar

* + - * 1. Furnish and install condensing, low NOx, natural gas-fired domestic water heaters with dimensions, capacities and electrical characteristics as scheduled on the Contract Drawings and as outlined herein. This Specification describes minimum quality and performance requirements. Variations of system components by the individual referenced manufacturers are acceptable for installation in this project provided they meet or exceed all of the requirements scheduled on Contract Drawings, indicated herein and fit properly in the space provided.
        2. The water heater shall be a vertical fire tube design that is constructed and stamped in accordance with Section IV, Part HLW of the ASME code. Both the storage and heating sections of the water heater shall be National Board Registered for a working pressure of 150 psi and shall be pressure tested at 1-1/2 times working pressure. The fireside of the heating surfaces shall be of boiler-grade steel. The waterside of the heating tubes shall be sealed in copper. The heating tubes shall be rolled, beaded, and seal welded into the tube sheets. The combustion side of the tube sheet shall be insulated by a layer of ceramic fiber that shall protect the tube sheet from both thermal stresses and failure that can result from the accumulation of scale and precipitants.
        3. The tank shall be a plated with electroless nickel. Plating shall occur after the pressure vessel is completely fabricated and all welding is completed. The electroless nickel plating shall be a high-phosphorus (10%) and nonporous composition suitable for submersion service (ASTM B733 standard may be used as a guideline). The finished lining shall not require sacrificial anode rods. For additional protection against galvanic corrosion, which may occur within the potable water system, the electroless nickel plating may have a high-dielectric-strength polymer overcoat.
        4. The tank shall be insulated and jacketed with steel panels finished with an industrial-quality coating.
        5. Combustion shall be provided by an induced-draft power burner with a gas train meeting Factory Mutual requirements for the scheduled input.
        6. Water heater shall be a category IV, condensing appliance, UL listed for use with CPVC vent or AL 29-4C stainless steel vent. Burner shall be configured to accept combustion air as indicated on Contract Drawings and factory equipped for direct venting and direct inlet air for up to 500 equivalent feet. Water heater shall operate with a minimum gas pressure of 4-½ inches water column.
        7. The water heater shall operate at a minimum of 94% thermal efficiency when tested to ANSI Z21.10.3. The water heater shall comply with paragraph 7.2.4.4, the thermal efficiency, the standby loss, and all other requirements of ASHRAE 90.1-1999.
        8. NOx emissions shall not exceed 30 ppm when corrected to 3% Oxygen (for inputs greater than 399,000 Btu). NOx emissions shall not exceed 55 ppm when corrected to 3% Oxygen (for 399,000 Btu input).
        9. The storage and heating sections shall be completely factory packaged on a single skid, requiring only job Site hookup to utilities, venting, and water inlet and outlet piping.
        10. As a minimum, each heater shall be equipped with the following components:

Dial temperature and pressure gauges.

Two immersion operating thermostats.

Tank circulator with intermittent pump operation.

Handhole tank cleanout.

Drain valve.

Induced draft blower.

Remote on/off terminals.

* + - * 1. As a minimum, each heater shall be equipped with the following safety controls:

Solid-state flame safeguard with pre-purge, programmable post-purge, and flame status indicating lights.

Immersion temperature limiting device.

Stack temperature limiting device.

ASME rated temperature and pressure relief valve.

Electronic low water cutoff.

Manual-reset, immersion temperature limiting device.

1. EXECUTION
   * + 1. INSTALLATION
          1. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
          2. All installation shall be in accordance with manufacturer’s published recommendations.
          3. Installation shall conform to all local, state, and national codes.
          4. Install the water heaters, piping, vents and accessories in accordance with the manufacturer’s published installation instructions.
          5. Furnish all supports required by the equipment included in this Contract.
          6. Provide a 4" thick, reinforced concrete housekeeping pad beneath heaters.
          7. Furnish and install all necessary valves, traps, gauges, strainers, unions, etc. to facilitate proper functioning and servicing of equipment.
          8. Install a line size shutoff valve in cold water inlet and hot water outlet close to each heater.
          9. Provide a temperature gauge in the domestic hot water piping within five feet of outlet to each heater, upstream of all shut-off valves. Size and locate gauges to be easily readable from a standing position.
          10. Provide dielectric isolation device where copper lines connect to ferrous lines or equipment, such as dielectric coupling or dielectric flange fitting.
          11. Route condensate to a vented receiver.
          12. Pipe relief valve discharge and all equipment drains indirectly to appropriate floor drain.
          13. Set the operating and safety controls.
          14. Set thermostats on domestic water heaters to deliver maximum water temperature as indicated on Contract Drawings.
          15. Furnish and install an expansion tank on cold water supply to heater. Locate tank as close to water heater as possible between water heater and all check valves or backflow preventers. Expansion tank capacity shall be as scheduled on Contract Drawings. Install expansion tank in accordance with manufacture’s recommendations.
       2. startup
          1. Startup shall be performed by factory trained and authorized personnel. The factory representative shall also provide a technical and practical operation and maintenance training seminar including a hands-on operation and maintenance demonstration, and classroom presentation with handouts and visual aids, for no less than three physical plant personnel.

END OF SECTION 22 34 36