

**SECTION 22 34 00**

**FUEL-FIRED DOMESTIC WATER HEATERS**

**PART 1 - GENERAL**

**1. DESCRIPTION**

- A. This section describes the requirements for installing a complete domestic gas fired hot water heating system ready for operation including water heaters, thermometers, and all necessary accessories, connections, and equipment.

**2. QUALITY ASSURANCE**

- A. Comply with American Society of Heating, Refrigerating and Air- Conditioning Engineers (ASHRAE) for efficiency performance:
  - 1. ASHRAE 90.1, Energy Efficient Design of New Buildings except Low-Rise Residential Buildings for commercial water heaters.”
- B. Electrical components, devices and accessories shall be listed and label as defined in NFPA 70 by a qualified testing agency, and marked for intended location and application.
- C. ASME code construction shall be a vessel fabricated in compliance with the ASME boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, “Drinking Water System Components – Health Effects”.

**3. SUBMITTALS**

- A. Submit manufacturer’s literature and data pertaining to the water heater in properly bound package, in accordance with GENERAL REQUIREMENTS and SPECIAL GENERAL REQUIREMENTS. Include the following as a minimum:
  - 1. Water Heaters.
  - 2. Pressure and Temperature Relief Valves.
  - 3. Thermometers.
  - 4. Pressure Gages.
  - 5. Vacuum Breakers.

6. Circulation Pumps.
  7. Expansion Tanks.
- B. For each natural gas fired domestic hot water heater type and size, the following characteristics shall be submitted:
1. Rated Capacities
  2. Operating characteristics
  3. Electrical characteristics
  4. Furnished specialties and accessories
- C. Shop drawings shall include wiring diagrams for power, signal and control functions.

#### **4. OPERATION AND MAINTENANCE DATA**

- A. Furnish to the owner the OIM, including inspection / start up sheets, replacement parts list, and service contact location and number.

#### **5. DELIVERY, STORAGE AND HANDLING**

- A. Deliver, store and protect products from weather, moisture and dirt contamination. Clean as required prior to installation. Maintain capped openings until products are installed.

#### **6. WARRANTY**

- A. Furnish to the owner a five year limited warranty.

### **PART 2 - PRODUCTS**

#### **1. ATMOSPHERIC GAS FIRED, STORAGE DOMESTIC WATER HEATERS**

- A. The gas fired domestic water heater shall comply with NFPS and UL requirements.
- B. The water heater design shall provide a combustion efficiency of at least 85% at operating conditions.
- C. The tank Construction shall be ASME code Steel, glass lined, with 160 psig working pressure rating.
- D. The tapping (Fittings) shall be factory fabricated of materials compatible with the tank and in accordance with appropriate ASME standards for piping connection, pressure and

temperature relief valve, pressure gauge, thermometer, drain valve, anode rods and controls. The tappings shall be:

1. 2 inch and smaller: Threaded ends according to ASME B1.20.1.
  2. 2 1/2-inch and larger: Flanged ends according to ASME B16.5 for steel and stainless steel flanges, and according to ASME B 16.24.
- E. The natural, gas fired burn shall include the following:
1. Thermostatically adjustable.
  2. High temperature limit and low water cutoff devices for safety controls.
  3. Automatic ignition in accordance with ANSI Z21.20.
- F. Temperature Setting shall be set for a maximum water temperature of 140°F. The temperature setting shall be adjustable. Provide a mixing valve to ensure water temperature does not exceed 110 degrees at the point of service for hand sinks, showers or other fixtures where water can come into contact with human skin. This requirement is in addition to the anti-scald valves on shower systems.
- G. The insulation shall surround the entire storage tank except connection and controls and shall comply with ASHRAE 90.1.
- H. The jacket shall be steel with enameled finish.
- I. The drain valve shall be corrosion resistant metal complying with ASSE 1005.
- J. The Combination Pressure and Temperature relief Valve shall be ANSI Z21.22 rated and constructed of all brass or bronze with a self-closing reseating valve.

## **2. POWER VENT, GAS FIRED, STORAGE DOMESTIC WATER HEATERS**

- A. The gas fired domestic water heater shall comply with NFPA and UL requirements.
- B. The water heater design shall provide a combustion efficiency of at least 95 percent at operating conditions.
- C. The tank Construction shall be ASME code Steel, glass lined, with 160 psig working pressure rating.

- D. The tapping (Fittings) shall be factory fabricated of materials compatible with the tank and in accordance with appropriate ASME standards for piping connection, pressure and temperature relief valve, pressure gauge, thermometer, drain valve, anode rods and controls. The tapings shall be:
  - 1. 2 inch and smaller: Threaded ends according to ASME B1.20.1.
  - 2. 2 1/2-inch and larger: Flanged ends according to ASME B16.5 for steel and stainless steel flanges, and according to ASME B 16.24.
- E. The natural gas-fired burner shall include the following:
  - 1. Thermostatic adjustment.
  - 2. Designed for use with power vent heaters
  - 3. High temperature limit and low water cutoff devices for safety controls.
  - 4. Automatic ignition in accordance with ANSI Z21.20.
- F. Temperature Setting shall be set for a maximum water temperature of 140°F. Provide a mixing valve to ensure water temperature does not exceed 110 degrees at the point of service for hand sinks, showers or other fixtures where water can come into contact with human skin. This requirement is in addition to the anti-scald valves on shower systems.
- G. The insulation shall surround the entire storage tank except connection and controls and shall comply with ASHRAE 90.1.
- H. The jacket shall be steel with enameled finish.
- I. The drain valve shall be corrosion resistant metal complying with ASSE 1005.
- J. The power vent system shall be interlocked with the burner.
- K. Combination Pressure and Temperature relief Valve: ANSI Z21.22 rated, constructed of all brass or bronze with a self-closing reseating valve.

### **3. DOMESTIC HOT WATER COMPRESSION TANKS**

- A. A steel pressure rated tank constructed with welded joints and factory installed butyl rubber diaphragm shall be installed as scheduled. The air pre charge shall be set to minimum system operating pressure at tank.

- B. The tappings shall be factory fabricated steel, welded to the tank and include ASME B1.20.1 pipe thread.
- C. The interior finish shall comply with NSF 61 barrier materials for potable water tank linings and the liner shall extend into and through the tank fittings and outlets.
- D. The air charging valve shall be factory installed.

#### **4. HEAT TRAPS**

- A. Heat traps shall be installed in accordance with ASHRAE 90.1, latest edition.

#### **5. COMBINATION TEMPERATURE AND PRESSURE RELIEF VALVES**

- A. The combination temperature and pressure relief valves shall be ASME rated and stamped and include a relieving capacity at least as great as the heat input and include a pressure setting less than the water heater's working pressure rating.

#### **6. GAS SHUTOFF VALVES**

- A. The gas shutoff valve shall be manually operated conforming to ANSI Z21.15.

#### **7. GAS PRESSURE REGULATORS**

- A. The gas pressure regulator shall be appliance type, pressure rating matching inlet natural gas supply temperature, and conforming to ANSI Z21.18.

#### **8. AUTOMATIC GAS VALVES**

- A. The automatic gas valves shall be appliance type, electrically operated, on-off automatic control, and conforming to ANSI Z21.21.

#### **9. THERMOMETERS**

- A. The thermometers shall be straight stem, iron case, red reflecting mercury thermometer or red liquid-filled thermometers, approximately 7 inches high, 40 to 240°F.

### **PART 3 - EXECUTION**

#### **1. INSTALLATION**

- A. The water heaters shall be installed on concrete bases.
- B. The water heaters shall be installed level and plumb.

- C. The water heaters shall be installed and connected in accordance with manufacturer's written instructions.
- D. All pressure and temperature relief valves discharge shall be piped to a nearby floor drains.
- E. Thermometers shall be installed on the water heater inlet and outlet piping.
- F. Vent piping from gas-train pressure regulators and valves shall be piped to the outside of building and shall conform to NFPA 54.
- G. The thermostats shall be set for a maximum setting of 140°F. Provide mixing valves as indicated above for tempering of water.
- H. Shutoff valves shall be installed on the domestic water supply piping to the water heater and on the domestic hot water outlet piping.
- I. All manufacturers' required clearances shall be maintained.
- J. A combination temperature and pressure relief valve shall be installed at the top portion of the storage tank. The sensing element shall extend into the tank. The relief valve outlet drain piping shall discharge by positive air gap into a floor drain.
- K. Piping type heat traps shall be installed on the inlet and outlet piping of the electric domestic hot water heater storage tanks.
- L. Water heater drain piping shall be installed as indirect waste to spill by positive air gap into open drains or over floor drains. Hose end drain valves shall be installed at low points in water piping for natural gas fueled domestic hot water heaters without integral drains.
- M. The type B combustion vent shall be installed and sized according to the water heaters recommendations and extended through the roof or wall as allows by the local fuel gas code or NFPA 54.
- N. Direct vent for condensing water heaters shall be constructed of CPVC, pitched to drain with a neutralization receptacle to a nearby floor drain. Install the CPVC venting, flashed through the building exterior, in compliance with NFPA 54 and manufacturer's IOM.

**2. PERFORMANCE TEST**

- A. All of the remote water outlets shall be tested to ensure a supply temperature of 110°F and a supply temperature of 140°F at kitchens at all times. If necessary, all corrections shall be made to balance the return water system or reset the thermostat to make the system comply with design requirements.
- B. Temperature limiting devices shall be tested to ensure proper function.

**- END OF SECTION -**