

**SECTION 22 35 00**  
**DOMESTIC WATER HEAT EXCHANGERS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

Domestic water heater exchangers complete, ready for operation including thermometers and all necessary accessories, connections and equipment.

**1.2 RELATED WORK**

- A. Preparation and finish painting Section 09 91 00, PAINTING.
- B. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
- C. Heater Insulation: Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.
- D. Piping, Fittings, Valves and Gages: Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING, 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING, and 22 11 00, FACILITY WATER DISTRIBUTION.

**1.3 SUBMITTALS**

- A. Submit manufacturer's literature and data pertaining to the water heater in properly bound package, in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Include the following as a minimum:
  - 1. Heat Exchangers.
  - 2. Pressure and Temperature Relief Valves.
  - 3. Steam Control Valves.
  - 4. Thermometers.
  - 5. Pressure Gages.
  - 6. Vacuum Breakers.

**1.4. APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American National Standard Institute (ANSI):
  - Z21.22-00/4.4A-00.....Relief Valves for Hot Water Supply systems
- C. American Society of Mechanical Engineers (ASME):
  - B1.20.1-83(R 1992).....Pipe Threads, General Purpose (Inch)
  - B16.5-03.....Pipe Flanges and Flanged Fittings
  - B16.24-01.....Cast Copper Alloy Pipe Flanges
  - PTC 25.3-02.....Pressure Relief Devices
  - Section IV-04.....Heating Boilers
  - Section VIII-04.....Pressure Vessels Division 1

## **PART 2 - PRODUCTS**

### **2.1 SHELL AND STEAM COIL WATER HEATERS**

- A. General: Semi-Instantaneous type, vertical with water in the shell and steam in the tubes, mounted on structural supports and shall be suitably insulated, jacketed, painted and provided with lugs. The entire unit shall be packaged ready for water and steam service. Construct in accordance with ASME Code for Pressure Vessels for a working pressure of 1000 kPa (150 psi).
- B. Pressure vessel: Shall be all welded construction and ASME Code Section VIII stamped for a working pressure of 1035 kPa (150 psig). The storage tank shall be solid stainless steel type 316L. Provide heavy-duty thick fiberglass insulation to comply with ASHRAE 90.1.
- C. Steam Heating Coil: U-tube type tubes are to be made of double wall seamless drawn copper tubing, designed for a maximum pressure of 1035 kPa (150 psig).
- D. Controls:
  - 1. Steam control valve shall regulate the control of steam flow to the heating coil to control water temperature and shall be electronic operated. Outlet water temperature shall not vary more than  $\pm 1$  degrees C ( $\pm 2.5$  degrees F).
  - 2. A drip trap, steam condensate trap (if required), Y strainer, vacuum breaker, and pressure gage shall be factory sized and piped with steam control valve.
  - 3. Solenoid Valve: 5 amp, 120-volt solenoid valve shall close the steam supply to the heating coil, should the water temperature in the tank reach the high set point.
- E. Tapping: 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, coil, and controls as required.
  - 1. 50-mm (2-inch) and smaller: Threaded ends according to ASME B1.20.1.
  - 2. 65-mm (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.
- F. Supports: heavy duty integrally welded steel supports for floor mounting.

### **2.2 THERMOMETERS**

Rigid stem or remote sensing, dial type; aluminum, black metal, stainless steel, or chromium plated brass case, back connected; mercury, vapor, BI-metal or gas actuated, with circular dial 90 mm (3 1/2 inches) in diameter with dual scales graduated from 4 to 100 degrees C (40 to

210 degrees F), with two-degree graduations guaranteed accurate within one scale division. Socket shall be separable, double-seat, micrometer-fittings, with extension neck not less than 65 mm (2 1/2 inches) to clear tank or pipe covering. Suitable for 20 mm (3/4 inch) pipe threads. Thermometers may be consoles mounted with sensor installed in separate thermometer well.

### **2.3 SAFETY VALVES FOR SHELL AND STEAM HEATERS**

- A. Provide a separate temperature relief valve and pressure relief valve or combination pressure/temperature relief valves on each water heater. Pipe discharge to floor.
- B. Temperature Relief Valves: All brass or bronze, automatic, self-closing reseating type valve, equipped with a noncorrosive metal thermostat with bulb extending into tank, that can be manually displaced from its seat for test purposes. Valve shall be tested and approved as to its BTU capacity by ASME or an independent laboratory satisfactory to the Contracting Officer. In no case shall total rated BTU relieving capacity of temperature relief valve, or valves, be less than BTU input into water heater. Temperature relief valve shall be completely open before temperature reaches 98 degrees C (210 degrees F) and shall close when temperature goes below 93 degrees C (200 degrees F).
- C. Pressure Relief Valves: Shall conform to requirements of ASME, Section IV. BTU relieving capacity of pressure relief valve, or valves, shall be not less than BTU input of the water heater. Set at 690 kPa (100 psig) pressure.
- D. Safety Over-Temperature System: Provide double solenoid safety system for each shell and steam coil heater. System shall consist of aquastat, pilot light, solenoid steam safety valve and solenoid water safety valve located in the control circuit. Set aquastat at 60 degrees C (140 degrees F).

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install water heaters on concrete bases. Refer to Specification Section 03 30 00, CAST-IN-PLACE CONCRETE and Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING
- B. Install water heaters level and plumb.
- C. Install and connect water heaters in accordance with manufacturer's written instructions.
- D. Pipe all pressure and temperature relief valves discharge to nearby floor drains.
- E. Install thermometers on water heater inlet and outlet piping.

F. Set the thermostats for a maximum setting of 54 degrees C (130 degrees F).

**3.2 LEAKAGE TEST**

Before piping connections are made, test water heaters with hydrostatic pressure of 1375 kPa (200 psi and 240 psi) for a unit with a MAWP of 160 psi. Correct any leakage or replace water heater and retest at no additional cost to the VA.

**3.3 PERFORMANCE TEST**

Ensure that all of the remote water outlets will have a minimum of 100 degrees F and a maximum of 120 degrees F water flow at all times. If necessary, make all correction to balance the return water system or reset the thermostat to make the system comply with design requirements.

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