

**PART 1 GENERAL****1.1 RELATED DOCUMENTS**

- A. The requirements of the General Conditions, Supplementary Conditions and the following Specification sections apply to all Work herein:
1. Section 22 00 10 - General Requirements
  2. Section 22 00 20 - Plumbing Scope of Work
  3. Section 22 05 07 - Design Conditions
  4. Section 22 05 13 - Motor Requirements for Plumbing Equipment
  5. Section 22 05 48 - Vibration Isolation
  6. Section 22 05 93 - Testing, Balancing and Adjusting

**1.2 SUMMARY**

- A. Furnish and install various items of miscellaneous equipment as specified herein and as indicated on the Drawings.

**1.3 REFERENCE STANDARDS**

- A. All equipment shall be designed, manufactured and tested in accordance with the latest applicable industry standards.
- B. All equipment and material to be furnished and installed on this Project shall be UL or ETL listed, in accordance with the requirements of the authorities having jurisdiction, and suitable for its intended use on this Project.

**1.4 SUBMITTALS AND PROPOSALS**

- A. The following submittal data shall be furnished according to the General Conditions and Section 22 00 10 and shall include, but not be limited to:
1. Electric Water Heaters including physical dimensions, capacity data, accessories, etc.
  2. Relief Valves, construction, materials, capacity data, settings, etc.
  3. Water Meters complete with physical dimensions, materials, capacity data, water pressure drops, connection details, etc.
  4. Prior to execution of factory testing and lab testing, submit test procedures, recording forms, and test equipment cut sheets to Engineer for review. Refer to Section 22 00 20 titled "Scope of Work" for "Scheduling Procedures".
  5. Factory Test Schedule.
  6. Factory Test Reports.
    - a. Hydrostatic Test Reports
    - b. Certified Factory Capacity Test Reports.
  7. Field Test Reports.
- B. All items or equipment listed above with asterisks (\*) shall be certified by the manufacturer using Manufacturer Certification "MCA" as set forth in Section 22 00 10. See Section 22 00 10 for certification requirements.

**1.5 WARRANTY**

- A. Comply with the requirements of the General Conditions and Section 22 00 10.

**PART 2 PRODUCTS****2.1 ACCEPTABLE MANUFACTURERS**

- A. If it complies with these Specifications, electric water heaters manufactured by one of the following manufacturers will be acceptable:
1. A. O. Smith
  2. PVI
  3. Rheem
  4. Rudd
  5. State
- B. If they comply with these Specifications, relief valves manufactured by one of the following manufacturers will be acceptable:
1. Consolidated
  2. Kunkel
  3. Watts
- C. If they comply with these Specifications, water meters manufactured by one of the following manufacturers will be acceptable:
1. Mueller Systems (Hersey)
  2. Neptune Technology Group
  3. Sensus Metering Systems (Rockwell)

**2.2 ELECTRIC WATER HEATERS**

- A. Type "EWH" domestic water heaters shall be residential grade, factory assembled and wired, electric type with the capacities as listed in the "Schedule of Capacities" on the Contract Documents and located where indicated on the Drawings. The complete heater shall be listed by ETL or Underwriters Laboratories, Inc. and shall bear the UL or ETL label. Unit shall be approved, listed and constructed in accordance with NSF Standard No. 5 and shall meet the energy efficiency requirements of ASHRAE Standard 90-A. Provide a two (2) year manufacturer's commercial installation warranty for the entire unit.
- B. The heating elements shall be removable, direct contact, screw-in immersion type sealed in a zinc- or tin-plated copper sheath with a maximum density of 75 watts per square inch. Electric water heaters scheduled to have an input power rating exceeding 6 kW shall have multiple elements (not to exceed 6 kW each) wired for simultaneous operation to meet the required capacity specified hereinafter.
- C. All heating elements shall be controlled by a common thermostat with an externally adjustable temperature range from 110°F to 170°F through magnetic contactors if current requirements exceed thermostat capacity. All controls shall be housed in full sized compartments with access panels mounted on front of tank.
- D. Tank shall be glass-lined welded steel designed for the working pressure indicated in the "Schedule of Capacities" on the Contract Documents and shall be vertical type. Heater shall be factory insulated and encased in corrosion resistant steel jacket with baked on enamel finish. Furnish and install an additional external slip on insulation jacket.
- E. Heater shall be provided with the following accessories: drain valve, high density rigidly supported magnesium anode, ASME temperature and pressure safety relief valve and ANSI certified vacuum relief valve.
- F. Where required due to space limitations heaters mounted above ceilings or in millwork cabinetry shall be provided with side inlet and outlet connections.

**2.3 RELIEF VALVES**

- A. Furnish and install relief valves where required and as indicated on the Drawings. Relief valve capacity shall be as required by the applicable code and as indicated in the "Schedule of Capacities" on the Contract Documents or as shown on the Drawings.

- B. Inlet and outlet piping from the relief valve shall be at least the size of the valve connections unless otherwise indicated on the Drawings.

## 2.4 WATER METERS

- A. Water meters shall be of the turbine type with magnetic drive and hermetically sealed register. Meter body casting shall be bronze. Trim shall be stainless steel.
- B. Flow shall be straight through the meter at all flow rates. All water measured by the meter shall be recorded on a single totalizing register.
- C. Meters requiring interface with the Division 25 BMCS shall be provided with a digital pulse output or 4-20mA analog output. Refer to Division 25 for coordination and Building Management and Control System (BMCS) interface.
- D. Meters and strainers shall meet or exceed AWWA Standard C701-78 for Class II turbine meters at both normal flow ranges and sustained flow limits, and domestic water meters must be approved for potable water use by the City Water Department.
- E. Meter shall be installed in accordance with the manufacturer's written recommendations. Provide a minimum of seven (7) pipe diameters of straight pipe immediately in front of the meter assembly and a minimum of five (5) pipe diameters of straight pipe immediately downstream of the meter assembly. Throttling valves, control valves, check valves, backflow preventers and pressure reducing valves shall not be installed upstream of any domestic water meter regardless of pipe separation. Reducer connections to meter assemblies, where used, shall be of the tapered, concentric type. Reducing flanges and eccentric step type reducers are unacceptable.
- F. Meters shall be furnished for various locations as noted below and shall be approved equal to the following Sensus Model Nos.
  - 1. Cooling Tower Makeup: Sensus #W-350 DR with flanged ends and 3" bronze strainer. 150 psig rating is required.
  - 2. Cooling Tower Blowdown: Sensus #W-160 DR with flanged ends and 2" bronze strainer. 150 psig rating is required.
  - 3. Cooling Filter Backwash: Sensus #W-160 DR with flanged ends and 2" bronze strainer. 150 psig rating is required

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. All equipment shall be installed in accordance with the latest industry standards, per the manufacturer's recommendations, and as indicated on the Drawings.

### 3.2 FACTORY TESTING

- A. All equipment shall be tested in accordance with the latest applicable industry standards and as specified herein.
- B. Heat exchangers shall be factory tested at full load (100%) to ensure that the units are in compliance with AHRI Standard 400-2001 with Addendum 2, for capacity and efficiency performance. Factory test shall may be witnessed by the Owner and/or Engineer. Heat exchangers shall be rated as per AHRI Standard 400-2001 with Addendum 2, and shall produce 100% of the specified capacity (0% AHRI tolerance on heat transfer). Cold side and hot side water pressure drop tolerances shall be allowed and shall not be more than 10% greater than the specified pressure drop at design conditions.
- C. For identical heat exchanger units, only one (1) unit need be factory tested.
- D. Certified factory test reports signed by a corporate officer shall be submitted to the Engineer and Owner within two (2) weeks of factory testing.

**3.3 FIELD TESTING**

- A. Refer to Section 22 05 93 for additional testing requirements for miscellaneous equipment.

**END OF SECTION**