

SECTION 15450
PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES:

- A. Water heaters.
- B. Packaged water heating systems.
- C. Water storage tanks.
- D. Water softeners.
- E. Pumps.
- F. Circulators.

1.2 REFERENCES

- A. ASHRAE 90A - Energy Conservation in New Building Design.
- B. ASME Section 8D - Pressure Vessels.
- C. NFPA 30 - Flammable and Combustible Liquids Code.
- D. NFPA 54 - National Fuel Gas Code.
- E. NFPA 58 - Storage and Handling of Liquefied Petroleum Gases.
- F. NFPA 70 - National Electrical Code.
- G. UL 1453 - Electric Booster and Commercial Storage Tank Water Heaters.
- H. UL 174 - Household Electric Storage Tank Water Heaters.
- I. FBC Florida Building Code

1.3 SUBMITTALS FOR REVIEW

- A. Section 01300 - Procedures for submittals.
- B. Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Indicate pump type, capacity, power requirements.
 - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
 - 4. Provide electrical characteristics and connection requirements.
- C. Shop Drawings:
 - 1. Indicate heat exchanger dimensions, size of tapings, and performance data.
 - 2. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tapings, and drains.

1.4 SUBMITTALS FOR INFORMATION

- A. Section 01300 - Submittals: Procedures for submittals.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Section 01700 - Contract Closeout: Procedures for submittals.
- B. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

- C. Warranty: Submit manufacturer's warranty and ensure forms are completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Provide pumps with manufacturer's name, model number, and rating/capacity identified.
- C. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
 - D. American Gas Association (AGA).
 - E. National Sanitation Foundation (NSF).
 - F. American Society of Mechanical Engineers (ASME).
 - G. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
 - H. National Electrical Manufacturers' Association (NEMA).
 - I. Underwriters Laboratories (UL).
 - J. American National Standards Institute (ANSI).
 - 1. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation; operate within 25% of midpoint of published maximum efficiency curve.

1.7 REGULATORY REQUIREMENTS

- A. Conform to AGA, ANSI 2 21.22, NFPA 54, NFPA 70, UL 174, UL 1453 requirements for water heaters.
- B. Conform to ASME Section 8D for manufacture of pressure vessels for heat exchangers.
- C. Conform to ASME Section 8D for tanks.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Material and Equipment: Transport, handle, store, and protect products.
- B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.9 WARRANTY

- A. Section 01740 - Warranties.
- B. Provide five-year manufacturer warranty for domestic water heaters, packaged water heating systems.

1.10 MAINTENANCE PRODUCTS

- A. Section 01730 - Operation and Maintenance Data.

PART 2 PRODUCTS

2.1 RESIDENTIAL GAS FIRED WATER HEATER

- A. Type: Automatic, natural gas-fired, vertical storage.

- B. Performance:
 - 1. Input: per design documents.
 - 2. Minimum recovery rate: gph (per design documents) with 100°F temperature rise.
 - 3. Maximum working pressure: 150 psig.
 - 4. Certification: CGA P.3.
- C. Tank: Glass lined welded steel single flue passage, flue baffle and draft hood; thermally insulated with glass fiber and encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
- D. Controls: Automatic water thermostat and built-in gas pressure regulator; temperature range adjustable from 120° to 170°F, cast iron or sheet metal burner, safety pilot and thermocouple.
- E. Accessories: Brass water connections and dip tube, drain valve, magnesium anode, thermometer, and ASME temperature and pressure relief valve. ANSI rated vacuum relief valve, if required; expansion tank, if required.

2.2 COMMERCIAL GAS FIRED WATER HEATER

- A. Type: Automatic, natural gas-fired, vertical storage.
- B. Performance:
 - 1. Input: BTUH per design documents.
 - 2. Minimum recovery rate: gph (per design documents) with 100°F temperature rise.
 - 3. Maximum working pressure: 150 psig.
- C. Tank: Glass lined welded steel ASME labeled; multiple flue passages, 4" diameter inspection port, thermally insulated with minimum 2" glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
- D. Accessories: Brass water connections and dip tube, drain valve, high-density magnesium anode, thermometer, and ASME rated temperature and pressure relief valve. ANSI rated vacuum relief valve, if required; expansion tank, if required.

2.3 Approval: By AGA as automatic storage water heater for operation at 180°F.

- A. Controls: Automatic water thermostat with temperature range adjustable from 120° to 180°F, automatic reset high temperature limiting thermostat factory set at 195°F, gas pressure regulator, multi-ribbon or tubular burner, 100% safety shut-off pilot and thermocouple, flue baffle and draft hood.

2.4 RESIDENTIAL ELECTRIC WATER HEATER

- A. Type: Automatic, electric, vertical storage.
- B. Performance:
 - 1. Minimum recovery rate: gph (per design documents) with 100°F temperature rise.
 - 2. Maximum working pressure: 150 psig.
- C. Tank: Glass lined welded steel, thermally insulated with one inch thick glass fiber; encased in corrosion-resistant steel jacket; baked-on enamel finish.
- D. Controls: Automatic water thermostat with adjustable temperature range from 120° to 170°F, flanged or screw-in nichrome elements, enclosed controls and electrical junction box and operating light. Wire double element units so elements do not operate simultaneously.
- E. Accessories: Brass water connections and dip tube, drain valve, magnesium anode, thermometer, and ASME rated temperature and pressure relief valve. ANSI rated vacuum relief valve, if required; expansion tank, if required.

2.5 COMMERCIAL ELECTRIC WATER HEATERS

- A. Type: Factory-assembled and wired, electric, vertical storage.
- B. Performance:
 - 1. Minimum recovery rate: gph (per design documents) with 100°F temperature rise.
 - 2. Maximum working pressure: 150 psig.
- C. Tank: Glass lined welded steel; 4" diameter inspection port, thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.
- D. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60° to 180°F, flanged or screw-in nichrome elements, high temperature limit thermostat.
- E. Accessories: Brass water connections and dip tube, drain valve, magnesium anode, thermometer, and ASME rated temperature and pressure relief valve. ANSI rated vacuum relief valve, if required; expansion tank, if required.

2.6 PACKAGED WATER HEATING SYSTEMS

- A. System: Gas-fired direct heating boiler, circulating pump, controls, piping and valving as indicated.
- B. Boiler:
 - 1. Type: Gas-fired water tube boiler, with copper finned tube heat exchanger, steel jacket with glass fiber insulation.
 - 2. Boiler Trim: Gas burner, thermometer and pressure gauge, immersion thermostats for operating and high limit protection, 100% safety shut-off electric gas valve with transformer, electronic safety pilot and pilot burner, gas pressure regulator, manual gas shut-off, low water cut off, ASME rated temperature and pressure relief valve, draft inverter.
 - 3. Performance:
 - a. Gross input: BTUH (per design documents), at sea level.
 - b. Gross output: BTUH (per design documents), at sea level.
- C. Vertical or Horizontal storage tank:
 - 1. Working pressure: 150 psi ASME labeled.
 - 2. Lining: 15 mils thick epoxy lining extended through flanges and couplings.
 - 3. Support: Two welded tank saddles not less than 4" wide by ¼" thick, mounted on 2" pipe stand with minimum four cross braced legs; sheet teflon isolation strip between tank and saddle; dielectric unions between tank and piping system.
 - 4. Insulation: 3" glass fiber insulation with aluminum jacket.
- D. Pump:
 - 1. Type: All bronze, in-line circulation pump controlled by tank mounted immersion thermostat set at 140°F.
- E. Thermostatic Valve: Three-way, self-contained, full line size, bronze body 2 to 2" size, iron body 2½" inches and over, set at 140°F.

2.7 WATER SOFTENERS

- A. Softener Tank: Glass fiber reinforced plastic tank.
- B. Brine Tank: Glass fiber reinforced plastic tank.
- C. Control: Brass control valve cycled to regenerate after adjustable metered quantity of water flow.

2.8 IN-LINE CIRCULATOR PUMPS

- A. Casing: Bronze, rated for 125 psig working pressure [with stainless steel rotor assembly.]
- B. Impeller: Bronze.

- C. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
- D. Seal: Carbon rotating against a stationary ceramic seat.
- E. Drive: Flexible coupling.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install water heaters and water softeners in accordance with manufacturer's instructions. In addition install water heaters to applicable AGA, ANSI, NFPA 54, UL requirements.
- B. Coordinate with plumbing piping and related fuel piping, gas venting and electrical work to achieve operating system.
- C. Domestic Water Heater Exchangers:
 - 1. Install domestic water heater exchangers with clearance for tube bundle removal without disturbing other installed equipment or piping.
 - 2. Support unit on pipe stand.
 - 3. Pipe relief valves and drains to nearest floor drain.
 - 4. Connect steam branch line from top of main. Pipe in flexible manner, pitched with steam flow, with pipe union connections. Provide steam pressure gauge at exchanger inlet.
 - 5. Provide steam traps and valves as indicated.
 - 6. Pitch shell for condensate drain to traps.
- D. Domestic Hot Water Storage Tank:
 - 1. Provide support, independent of building structural framing members.
 - 2. Clean and flush tank. Seal until pipe connections are made.
- E. Pump:
 - 1. Ensure shaft length allows sump pumps to be located minimum 24" below lowest invert into sump pit and minimum 6" clearance from bottom of sump pit.
 - 2. Provide air cock and drain connection on horizontal pump casings.
 - 3. Provide line sized isolating valve and strainer on suction and line sized soft-seated check valve and balancing valve on discharge.
 - 4. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4" and over.
 - 5. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25% of midpoint of published maximum efficiency curve.
 - 6. Align and verify alignment of base mounted pumps prior to start-up.

END OF SECTION