SECTION 223436

PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water heaters.

B. Packaged water heating systems.

C. Water softeners.

D. Pumps.
1. Circulators.
2. Sump Pumps.

1.2 RELATED SECTIONS

A. Section 22 05 29 - Supports and Anchors for Plumbing Systems.

B. Section 23 05 48 - Vibration Isolation.

C. Section 26 05 05 - Equipment Wiring Systems: Electrical characteristics and wiring connections.

1.3 REFERENCES

A. ANSI/ASHRAE 90A - Energy Conservation in New Building Design.

B. ASME Section VIIID - Pressure Vessels; Boiler and Pressure Vessel Codes.

C. NFPA 30 - Flammable and Combustible Liquids Code.

D. NFPA 54 - National Fuel Gas Code.

E. NFPA 70 - National Electrical Code.

F. UL 174 - Household Electric Storage Tank Water Heaters.

G. NEMA 250 - Enclosure for Electrical Equipment (1000 Volts Maximum).

1.4 SUBMITTALS

A. Submit under the provisions of Division 01.

B. Shop Drawings:
1. Include heat exchanger dimensions, size of tappings, and performance data.
2. Include dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

C. Product Data:
1. Include dimension drawings of water heaters indicating components and connections to other equipment and piping.
2. Indicate pump type, capacity, power requirements, and affected adjacent construction.

3. Submit 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.

D. Manufacturer's Installation Instructions: Indicate assembly and support requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

A. Submit under the provisions of Division 01.

B. Project Record Documents: Record actual locations of components.

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

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with a minimum of three (3) years' experience.

B. Provide pumps with the 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:
1. American Gas Association (AGA).
2. National Sanitation Foundation (NSF).
3. American Society of Mechanical Engineers (ASME).
4. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
5. National Electrical Manufacturers Association (NEMA).
6. Underwriters Laboratories (UL).

D. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.7 REGULATORY REQUIREMENTS

A. Conform to AGA, NSF, ANSI/NFPA 54, requirements for water heaters.

B. Conform to ASME Section VIIID for manufacture of pressure vessels for heat exchangers.

C. Conform to ASME Section VIIID 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. Deliver, store, protect, and handle products to site under provisions of Section 22 05 00.

B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.9 WARRANTY

A. Provide a three (3) year warranty under the provisions of Division 01.

B. Warranty: Include coverage of domestic water heaters in-line circulator sump pumps.

PART 2 PRODUCTS

2.1 COMMERCIAL GAS FIRED WATER HEATER

A. Manufacturers:
   1. Lochinvar.
   2. Other acceptable manufacturers offering equivalent products.
      a) State Industries.
      b) A.O. Smith.
      c) Hesco.

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

C. Tank: Glass lined welded steel ASME labeled; multiple flue passages, 4-inch diameter inspection port, thermally insulated with minimum 2 inches 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, and ASME rated temperature and pressure relief valve.

E. Approval: By AGA as automatic storage water heater and automatic circulating tank water heater.

F. Controls: Automatic water thermostat with temperature range adjustable from 120 to 180 degrees F, gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple, flue baffle and draft hood.

2.2 PACKAGED WATER HEATING SYSTEM

A. Manufacturers:
   1. Lochinvar.
   2. Other acceptable manufacturers offering equivalent products.
      a) A.O. Smith.
      b) Hesco.
      c) Raypak.

B. System: Gas-fired direct heating boiler, circulating pump, controls, piping and valving as indicated, storage tank, all mounted on structural steel skid.

C. 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 percent 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 invertor.

D. Vertical storage tank:
   1. Working pressure: 125 psi ASME labeled.
   2. Lining: 12 mils thick epoxy lining extended through flanges and couplings.
   3. Insulation: 3-inch glass fiber insulation with steel jacket.

E. Pump:
   1. Type: All bronze, in-line circulation pump mounted between heater and storage tank, controlled by tank mounted immersion thermostat set at 140 degrees F.

F. Thermostatic Valve: Three-way, self-contained, full line size, bronze body ½ to 2 inches size, iron body 2-1/2 inches and over, set at 120 degrees F.

2.3 DIAPHRAGM-TYPE COMPRESSION TANKS

A. Manufacturer:
   1. Bell & Gossett.
   2. Other acceptable manufacturers offering equivalent products.
      a) Amtrol.

B. Construction: Welded steel, tested and stamped in accordance with Section 8D of ASME Code; supplied with National Board Form U-1, rated for working pressure of 125-psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.

C. Accessories: Pressure gage and air-charging fitting, tank drain; pre-charge to 12-psig.

2.4 WATER SOFTENERS

A. Manufacturers:
   1. Culligan.
   2. Other acceptable manufacturers offering equivalent products.
      a) Continental.
      b) Rainsoft.

B. Softener Tank: Glass fiber reinforced plastic tank.

C. Brine Tank: Glass fiber reinforced plastic tank.

D. Control: Reinforced plastic control valve cycled to regenerate from one to twelve-day period.

2.5 HOT WATER RECIRC BALANCING

A. Therm-Omega-Tech, circuit solver, thermostatically self-balancing control valve.

2.6 IN-LINE CIRCULATOR PUMPS

A. Manufacturers:
   1. Bell & Gossett.
   2. Other acceptable manufacturers offering equivalent products.
      a) Grundfos.
      b) Armstrong.

B. Casing: Bronze, rated for 125-psig working pressure.

C. Impeller: Bronze.

D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.

E. Seal: Carbon rotating against a stationary ceramic seat.

F. Drive: Flexible coupling.

PART 3 EXECUTION

3.1 WATER HEATER INSTALLATION

A. Install water heaters in accordance with the manufacturer's instructions and to AGA NSF, ANSI/NFPA 54 requirements.

B. Coordinate with plumbing piping and related fuel piping gas venting electrical work to achieve operating system.

C. Pipe relief valves and drains to nearest floor drain.

3.2 DOMESTIC HOT WATER STORAGE TANK INSTALLATION

A. Install tanks in accordance with the manufacturer's instructions.

B. Provide support for tanks, independent of building structural framing members.

C. Clean and flush tank prior to delivery to site and after installation. Seal until pipe connections are made.

3.3 PUMP INSTALLATION

A. Install in accordance with the manufacturer's instructions.

B. Ensure shaft length allows sump pumps to be located minimum 24 inches below lowest invert into sump pit and minimum 6 inches clearance from bottom of sump pit.

C. Provide air cock and drain connection on horizontal pump casings.

D. Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.

E. 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 support under elbows on pump suction and discharge line sizes 4 inches and over.

F. 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 percent of midpoint of published maximum efficiency curve.

G. Align and verify alignment of base mounted pumps prior to start-up.

END OF SECTION