

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and Division 00 and 01, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following heat exchangers:
 - 1. Heating-fluid-in-coil, semi-instantaneous heat exchangers.
 - 2. Heating-fluid-in-U-tube-coil, semi-instantaneous heat exchangers.
 - 3. Compression tanks.
 - 4. Heat-exchanger accessories.

1.3 DEFINITIONS

- A. Domestic Water Piping: Piping inside building that conveys potable cold and hot water to fixtures and equipment throughout the building.

1.4 SUBMITTALS

- A. Product Data: For each type and size of heat exchanger. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories. Detail heat exchanger assemblies and indicate dimensions, loads, required clearances, method of any field assembly, components, and location and size of each field connection. Wiring Diagrams: Power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring.
- B. Manufacturer Seismic Qualification Certification: Submit certification that heat exchangers, accessories, and components will withstand seismic forces defined in Division 23.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For heat exchangers to include in emergency, operation, and maintenance manuals.
- E. Warranty: Special warranty specified in this Section.

1.5 CODES AND STANDARDS

- A. Codes and Standards shall be the current version adopted by the Authority Having Jurisdiction.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain same type of heat exchangers through one source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label heat-exchanger storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. Comply with the Reduction of Lead in Drinking Water Act of 2011. This act redefines "lead free" as "not containing more than 0.2 percent lead when used with respect to solder and flux and not more than a weighted average of 0.25 percent lead when used with respect to wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures". Products required to be "lead free" shall have NSF 61-G or NSF 372 certification.
- E. Soldered Lead Free End Connections: Copper alloys with silicone content greater than 0.005% are not allowed.

1.7 COORDINATION

- A. Coordinate size and location of concrete housekeeping pads with Architectural and Structural Drawings.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of heat exchangers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including heat exchanger, storage tank, and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Period(s): From date of Substantial Completion:
 - a. Semi-Instantaneous Heat Exchangers:
 - 1) Tube Coil and Shell: 10 years.
 - 2) Controls and Other Components: 10 years.
 - b. Circulating, Storage Heat Exchangers:
 - 1) Storage Tank: Five years.
 - 2) Tube Coil: Five years.
 - 3) Controls and Other Components: Three years.
 - c. Heat Reclaimers: [One] <Insert number> year(s).
 - d. Compression Tanks: [One] <Insert number> year(s).

PART 2 – PRODUCTS

2.1 BASIC, COMMON FEATURES

- A. Lead free products and materials shall be used.

- B. Soldered Lead Free End Connections: Copper alloys with silicone content greater than 0.005% are not allowed.

2.2 SEMI-INSTANTANEOUS HEAT EXCHANGERS

- A. Heating-Fluid-in-Coil, Semi-Instantaneous Heat Exchangers:

1. Manufacturers:
 - a. AERCO International, Inc.
 - b. Or Approved Equal.
2. Description: Packaged assembly of tank, heat-exchanger coils, controls, and specialties for heating domestic water with [heating hot water] [steam] in heat-exchanger coils.
3. Construction: ASME-code, negligible-capacity, copper-lined, carbon-steel shell with [150-psig] <Insert psig (kPa)> minimum working-pressure rating.
 - a. Tappings: Factory fabricated of materials compatible with heat-exchanger shell. Attach tappings to shell before testing and labeling.
 - 1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
 - 2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - b. Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire shell and nozzle except connections and controls.
 - c. Heat-Exchanger Coils: [Copper] [Copper nickel] [Stainless-steel], helix-wound coils for heating fluid with pressure rating equal to or greater than heating-fluid supply pressure.
 - d. Temperature Control: Adjustable thermostat that operates control valve and that is capable of maintaining outlet-water temperature within 4 deg F of setting.
 - e. Safety Control: Automatic, high-temperature-limit cutoff device or system.
 - f. Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select one relief valve with sensing element that extends into storage tank.
4. Miscellaneous Components for Heating Hot-Water Unit: Control valve, valves, and piping. [Include components fitted for pneumatic control.]
5. Miscellaneous Components for Steam Unit: Strainers, steam-control valve, steam trap, valves, pressure gage, thermometer, and piping. [Include components fitted for pneumatic control.]
 - a. Exception: Steam trap is not required if manufacturer's written instructions direct that it not be used.
6. Stand: Factory fabricated for floor mounting.

- B. Heating-Fluid-in-U-Tube-Coil, Semi-Instantaneous Heat Exchangers:

1. Manufacturers:
 - a. Armstrong International, Inc.
 - b. Precision Boilers.
 - c. PVI Industries, LLC.
 - d. Sellers Engineering Co.
 - e. Or Approved Equal.
2. Description: Tankless, packaged assembly of heat-exchanger coil, controls, and specialties for heating domestic water in shell with [heating hot water] [steam] in coil.
3. Construction: ASME-code, negligible-capacity, copper-lined, carbon-steel or copper-alloy shell with 150-psig minimum working-pressure rating.
 - a. Configuration: [Horizontal] [Vertical].
 - b. Shell Tappings: Factory fabricated of materials compatible with water heater shell. Attach tappings to shell before testing and labeling.
 - 1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
 - 2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - c. Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire shell and nozzle except connections and controls.
 - d. Heat-Exchanger Coil: Copper, double-wall, U tubes for heating fluid.
 - 1) Tube Pressure Rating: Equal to or greater than heating-fluid supply pressure.
4. Temperature Control: Adjustable thermostat that operates steam-control valve and that is capable of maintaining outlet-water temperature within 5 deg F of setting.
5. Safety Control: Automatic, high-temperature-limit cutoff device or system.
6. Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select one relief valve with sensing element that extends into shell.
7. Miscellaneous Components for Heating Hot-Water Unit: Control valve, valves, and piping.
8. Miscellaneous Components for Steam Unit: Strainers, steam-control valve, steam trap, valves, pressure gage, thermometer, and piping.
9. Stand: Factory fabricated for floor mounting.

2.3 COMPRESSION TANKS

- A. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
 1. Manufacturers:
 - a. AMTROL Inc.

- b. Armstrong Pumps, Inc.
- c. Bell & Gossett.
- d. Smith, A. O.; Aqua-Air Div.
- e. State Industries, Inc.
- f. Taco, Inc.
- g. Wessels Co.
- h. Or Approved Equal.

2. Construction:

- a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
- b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
- c. Air-Charging Valve: Factory installed.

3. Capacity and Characteristics:

- a. Working-Pressure Rating: 150 psig.
- b. Capacity Acceptable: [2 gal.] [4 gal.] [7 gal.] [10 gal.] <Insert volume> minimum.
- c. Air Precharge Pressure: <Insert system pressure>.

2.4 HEAT-EXCHANGER ACCESSORIES

- A. Combination Temperature and Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select relief valves with sensing element that extends into heat-exchanger storage tank.
- B. Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include pressure setting less than working-pressure rating of heat exchanger.
- C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.

2.5 SOURCE QUALITY CONTROL

- A. Test and inspect heat-exchanger storage tanks, specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test commercial heat-exchanger storage tanks before shipment to minimum of one and one-half times pressure rating.
- C. Prepare test reports.

PART 3 – EXECUTION

3.1 HEAT-EXCHANGER INSTALLATION

- A. Install heat exchangers on concrete housekeeping pads.
 - 1. Concrete base construction requirements are specified in Division 23.

- B. Install heat exchangers level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
- C. Anchor heat exchangers to substrate.
- D. Install seismic restraints for heat exchangers. Anchor to substrate.
- E. Install temperature and pressure relief valves in top portion of storage tank shells of heat exchangers with domestic water storage. Use relief valves with sensing elements that extend into shells. Extend relief-valve outlet, with drain piping same as water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- F. Install [combination temperature and] pressure relief valves in water piping for heat exchangers without storage. Extend relief-valve outlet, with drain piping same as water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- G. Install heat-exchanger drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for heat exchangers that do not have tank drains. Refer to Division 22 for hose-end drain valves.
- H. Install thermometer on each heat-exchanger domestic-water [inlet and] outlet piping, and install thermometer on each heat-exchanger heating-fluid [inlet and] outlet piping. Refer to Division 23 Section "Meters and Gages for Mechanical Piping" for thermometers.
- I. Install pressure gages on heat-exchanger heating-fluid piping. Refer to Division 23 for pressure gages.
- J. Fill heat exchangers with water.
- K. Charge compression tanks with air.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to heat exchangers to allow service and maintenance. Arrange piping for easy removal of heat exchangers.
- C. Ground equipment according to Division 26.
- D. Connect wiring according to Division 26.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect [, test, and adjust] field-assembled components and equipment installation, including connections [, and to assist in field testing]. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.

2. Operational Test: After electrical circuitry has been energized, confirm proper operation.
 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace heat exchangers that do not pass tests and inspections and retest as specified above.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain heat exchangers. Refer to Division 01.

END OF SECTION