

## DESIGN SPECIFICATIONS

### VESSELS

- A. Pressure vessels shall be designed, fabricated, tested, inspected, and stamped in compliance with the latest edition of Section VIII, Division 1 (Rules for Construction of Pressure Vessels) of the ASME Boiler and Pressure Vessel Code, and ANSI B9.1 Safety Code for Mechanical Refrigeration Systems. Pressure vessels shall be stamped with ASME Certification Mark, and registered with the National Board of Boiler and Pressure Vessel Inspectors. The ASME Nameplate shall be attached to each vessel with a stainless-steel pipe standoff. For insulated vessels, provide a standoff for ASME Nameplate to project a minimum of 6 inches from the vessel wall or 1" plus the insulation thickness, whichever is greater.
- B. All carbon steel vessels shall be post weld heat treated (PWHT) after fabrication per ASME Code. Exceptions would be vessels fabricated of stainless steel, Oil Separators, Shell and Tube Heat Exchanger, Tube bundles, Plate and Frame Heat Exchangers, and Shell and Plate Heat Exchangers.
- C. All vessels shall be suitable for service with ammonia within the design pressure and temperatures indicated in the drawings. The Maximum Allowable Working Pressure (MAWP) shall be a minimum design pressure of 250 psig for low side vessels and 300 psig for all high side vessels from -20F to +300F. Vessels operating below -20F may be dual stamped as per ASME Code. The Minimum Design Metal Temperature (MDMT) shall correspond to the lowest anticipated system operating temperature. All vessels shall be designed for full vacuum.
- D. An external corrosion allowance of 1/16" shall be included as prescribed in IIAR-2 Handbook when the vessel is located in a corrosive atmosphere.
- E. All vessel components, including heads, shells, pipe nozzles, V-baffles, etc. must be shot blasted to SSPC-6 on the interior and exterior of the component before assembly into the vessel.
- F. All vessels must be thoroughly cleaned and inspected before the last head is attached to the vessel.
- G. All vessels shall be tested in accordance with the latest edition of ASME Code.
- H. All vessels shall be vacuum tested and held in a vacuum for a minimum of one hour.
- I. All high temperature vessels (uninsulated) shall be painted with a base layer of two components, high solids epoxy coating and a finish layer of a two component, glossy acrylic, polyurethane coating in IIAR Forceful Orange color. All medium and low temperature vessels (insulated) shall be painted with a two component, high solids epoxy coating in IIAR Hyper Blue color.
- J. All vessels to be shipped with 15# of dry nitrogen with gauge, gauge valve, and safety stickers indicating that the vessel is shipped under pressure.

## PACKAGES

A. Recirculator packages shall be manufactured at a manufacturing facility and not at the job site. Packages shall be furnished with minimum of two pumps, each sized for total flow (100% backup). Teikoku canned motor pumps are the preferred manufacturer. Each pump shall have pump suction, pump discharge, and motor cooling line isolation valves. There shall be a discharge check valve installed between the pump and the discharge isolation valve. All vents lines must be piped into the gaseous portion of the recirculator vessel with "locked open" isolation valves. The Level column shall be provided with level eyes and frost shields located at high level shutdown, high level alarm, operating level(s), and low level shutdown as a minimum and include a mechanical high level float switch and liquid level transmitter with 4-20mA output. The Oil pot shall include all isolation valves and a spring return drain valve. The Oil pot must be relieved into the recirculator vessel and all relief valves sized accordingly. The Recirculator Package shall include dual relief valves shipped loose with the package and all necessary controls for a complete package.

B. Piping shall not allow trapping of liquid which may expand and cause damage. The piping between the pump discharge check valve and the pump discharge isolation valve must relieve per piping code. A reseating relief valve shall be installed and piped back to the Recirculator vessel with a locked open isolation valve.

C. The Recirculator Package shall include all necessary pump and level controls for a complete standalone package. Recirculators shall be furnished with a UL/cUL listed control panel in a NEMA-4 enclosure fully wired and tested which shall provide the following functionality:

1. Single point power connection with disconnect.
2. Starters for pumps.
3. Pump differential pressure monitoring and safety cutouts.
4. Independent high level compressor cutout float and circuit.
5. Liquid level control, monitoring and alarming.
6. Ability to detect low pump flow and automatically open minimum flow bypass valve(s)
7. Automatically energize the other pump in the event one fails.
8. Read 4-20 mA signal from level probe and provides digital readout on panel.
9. Automatically controls (up to two) proportional liquid feed valve(s).
10. Utilize MODBUS over RS-485 or Ethernet to communicate with Refrigeration Control System.

D. All packages shall be tested in accordance with B31.5 Piping Code latest edition.

E. All Packages shall be vacuum tested and held in a vacuum for a minimum of one hour.

F. All high temperature Packages (uninsulated) shall be painted with a base layer of two components, high solids epoxy coating and a finish layer of a two component, glossy acrylic polyurethane coating in IAR Forceful Orange color. All medium and low temperature Packages (insulated) shall be painted with a two component, high solids epoxy coating in IAR Hyper Blue color.

G. All Packages to be shipped with 15# of dry nitrogen with gauge, gauge valve, and safety stickers indicating that the vessels is shipped under pressure unless the package.