ROTH PUMP COMPANY

SPECIFICATION FORM FOR DEAERATOR

A. The deaerator shall be a style "RDTV" deaerator which guarantees oxygen removal to 0.005 cc/l (7 ppb) or less and carbon dioxide removal to a zero measurable level in the effluent throughout all load conditions between 0% and 100% of rated capacity. The deaeration process will take place in a 5-15 psig steam environment that will heat the water to 228-250ºF requiring a pressurized vessel. The deaerator shall be manufactured in strict accordance with the ASME Section VIII, Div. 1 code and bear the ASME stamp for a maximum working pressure of 50 psig at 300ºF. An atmospheric deaerator is not acceptable. A minimum of 1/16" corrosion allowance shall be added to the ASME calculated material thickness for heads and shell and will be noted on the ASME data report (form U-1). The deaerator is to be of the vertical design with a vessel of ____" diameter x ____" high setting less than 18" from the floor.

B. The deaerator is to be of the tray type design. Spray type deaerators are not acceptable. Flow of steam shall be such that the steam entering the heater first comes in contact with the hottest water which is leaving the last row of trays and then proceeds upward through the tray stack in a counter-flow fashion. The water to be deaerated will enter the vessel through a stainless steel spray tube. The spray tube will disperse water into a 304L stainless steel box that is sealed so that escaping gasses can not come in contact with the vessel walls. The gases escape through a 304L vent condenser pipe on top of the tray box that extends out the top of the vessel. The spray tube directs the water into sections of a 304L stainless steel vent welded on top of the tray box. The water falls downward from the vent condenser and spreads over the stainless steel trays and, after deaeration, falls into the storage area. The stainless steel (304L) trays will be removable through a minimum 20" dia. hinged tray access door. Each tray shall weigh no more than 30 lbs. for easy handling and inspection and shall be of welded construction. Rivets are not acceptable. The deaerator will be designed so that undeaerated water will only come into contact with stainless steel components.

C. The tray type deaerator is to be fully trimmed by the manufacturer including the following items:

1. **Low Level Control:** An external float type control is to be supplied to monitor a low level condition. A low level shall ring an alarm bell and light a red light on the control panel notifying the operator. The control shall also shut off the deaerator pumps protecting them from harm.

2. **High Level Control:** An external float type control is to be supplied to monitor a high level condition. A high level shall ring an alarm bell and light a red light on the control panel notifying the operator. The high level control shall be activated before the water reaches the overflow level.

3. **Overflow Trap:** A mechanical self-contained external float type overflow trap shall be supplied to overflow the water in the storage area before flooding the deaerator. The overflow trap body is to be constructed of cast iron. Inside the body, a stainless steel ball float automatically operates a double-seated brass valve. The cast iron body is to be bolted together in order to take apart for inspection/maintenance of the valve assembly. A

butterfly valve is to be supplied between the deaerator and the trap for inspection without having to shut down the deaerator.

4. **Make-up Water Assembly:** An electric water level controller and make-up water valve is to be supplied to monitor the level of water storage in the deaerator and add make-up water when necessary for continued operation. The level to activate the water valve shall be field adjustable to match desirable operating conditions. The water valve shall be suitable for operation with a pressure differential of up to 150 psi. The valve shall default to a closed position when de-energized and be a modulating or slow closing valve in order to reduce or eliminate water hammer. The valve shall be factory piped with a 3-valve bypass assembly and strainer.

5. **Pressure Reducing Valve:** A self-contained pilot operated valve shall be supplied when necessary to reduce the available steam pressure to the operating pressure of the deaerator (5-15 psig). The valve is to be shipped loose for field installation. Relief valve(s) acceptable for ASME service shall also be supplied. The relieving capacity of the valves shall be greater than the maximum capacity of the pressure reducing valve and set to relieve at 50 psig.

6. **Vacuum Breaker:** A vacuum breaker is to be supplied to release any vacuum in the deaerator during operation.

7. **Vent Valve:** A manual valve shall be supplied to vent the deaerator. The valve is to have the ability to be field adjustable with a 1/8” drilled orifice to avoid complete shut off capability.

8. **Drain Valve:** A gate valve is to be supplied and sized the same diameter as the drain connection and be supplied by the manufacturer.

9. **Misc. Gauges:** A pressure and temperature gauge shall be supplied and installed by the manufacturer. The gauges shall be sized suitable for the operation and design range of the deaerator and follow any ASME or local codes and requirements. A gauge glass shall be supplied and installed to cover the water level range from low level to overflow level. The gauge glass shall be protected from getting hit by outside objects and be so mounted to protect from getting broken.

10. **Pump Suction:** The pump suction shall be sized on a velocity 3 ft/sec of twice the deaerator capacity. A separate gate valve, strainer, and flexible connector shall be supplied for each pump.