SPRAY DEAERATOR SAMPLE SPECIFICATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Spray Type Feedwater Deaerator
   2. Deaerator trim

1.2 REFERENCES

A. American Society of Mechanical Engineers (ASME):
   1. BPVC Section VIII-Rules for Construction of Pressure Vessels Division 1
   2. B31.1 - Power Piping

B. National Electrical Manufacturers Association (NEMA)
   1. NEMA 250 - Enclosures for Electrical Equipment

C. Occupational Safety and Health Administration (OSHA)
   1. Fixed Ladders – 1917.118
   2. Guardrails – 1910.23

1.3 SUBMITTALS

A. Submittals shall include:

1. Product Data: Full product description including all accessories and control settings.
2. Drawings: Submit general arrangement drawing; including dimensions, weights and ratings, wiring diagrams.
3. Include materials of construction of major pressure vessel parts and fittings.
4. Controls Cutsheet: Submit complete set of cutsheets for trims and controls.
5. Rigging instruction: Submit detailed instructions on manufacturers recommended lifting and unloading procedures.
6. Warranty: Submit standard form equipment warranty.

B. Closeout Submittals:

1. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, cleaning procedures, recommended spare parts list, and maintenance and repair information.
2. Manufacturer's Installation Instructions: Submit assembly, support details, connection requirements, and include start-up instructions.
3. ASME Data Reports: Submit code paperwork required for field acceptance.

1.4 QUALITY ASSURANCE

A. The packaged deaerator must receive factory tests to check the construction, controls, and operation of the unit.

B. Allow witnessing of factory inspections and tests at manufacturer’s test facility

1.5 DELIVERY, STORAGE, AND HANDLING

A. Cover all openings, leave drain valves in open position, wrap electronics in plastic.
B. Offload deaerator in accordance with deaerator rigging instructions.

1.6 WARRANTY

A. Superior Boiler warrants all equipment manufactured by it and bearing its nameplate to be free from defects in workmanship and material, under normal use and service within one year from the date the equipment is first placed in use for any purpose, temporary or otherwise, or eighteen (18) months from the date of shipment, whichever shall be less. Except where a different expressed written warranty has been issued, no warranty of any kind, express or implied, is extended by Superior to any person or persons other than its direct buyer.
B. Warranty shall not apply to products or parts not manufactured by Superior Boiler.

PART 2 – PRODUCTS

2.1 FEEDWATER DEAERATOR

A. Manufacturers:
    1. Superior Boiler

B. Type: The deaerator shall be of the atomizing spray type.

C. Operation: Incoming water first enters the deaerator, through spray valves, into a steam atmosphere in the first stage preheater section. There, the water is heated to within 2°F of the steam temperature, removing virtually all the oxygen and free

carbon dioxide. This is accomplished by spraying the water through self-adjusting spray valves, designed to produce uniform, thin, controlled film under all load conditions. From the first stage section, the preheated water, containing minute traces of dissolved gases, flows into the second stage, or deaeration section. The second stage consists of a scrubber, where preheated water is brought into direct contact with fresh, gas free steam. Here all minute traces of gases are "scrubbed" from the now deaerated water. The fully deaerated water then drops into the storage section, ready for use by the boiler.

D. Performance: The deaerator shall heat, deaerate and deliver up to _____ pounds per hour and provide _____ (minutes) of storage capacity below the overflow level. The deaerator shall operate satisfactorily at all loads up to its rated capacity and shall be guaranteed to heat water to saturation temperature of the steam in the heater shell and to deliver the water with an oxygen content not exceeding 0.005 cc/liter.

E. Capacities and Characteristics:
   1. Capacity: Capable of raising the temperature of condensate and makeup water to within 2°F of saturated steam temperature. Provide a minimum storage capacity of ten minutes at overflow based upon the design point.
   2. Working Pressure: The deaeration process will take place in a 5-15 psig steam environment that will heat the water to 228-250°F.

F. Construction:
   1. Codes: Comply with ASME BPVC Section VIII, and all other applicable sections of the current edition of the ASME code.
   2. Shell and Head Thickness: SA516-70, minimum 3/8" thick. Deaerator shall be stamped 50 psig per ASME section VIII at 400°F.
   3. Material for Wetted Components: Components in contact with water that has not been deaerated shall be stainless steel.
   4. Factory-Applied Insulation and Jacket: Minimum thickness of 2 inches for mineral-fiber pipe and tank insulation. Cover insulation with preformed and

removable sections of painted steel jacket to uniformly follow the contour of the tank.

5. Manway: Deaerator shall have a 12" by 16" elliptical manway in storage tank, located away from the deaeration section or internal piping. Manway location shall allow unrestricted access to tank interior with no interference from internal equipment and piping, and easy access from outside the tank.
6. Support: Steel saddles or legs welded to storage tank with minimum height to provide for the net positive suction head required of the pumps selected. Coordinate location with structural design of building.
7. Nameplates: Attach to bracket projecting beyond field-applied insulation. Provide all ASME pressure vessel nameplate information as required by the Code along with information identifying the designer and manufacturer of the storage tank and the deaeration section.
8. Rigging: The deaerator is to be equipped with two lifting eyes, located on the top center line

G. Factory Inspection and Certification: The completed deaerator assembly shall be inspected and certified in compliance with ASME BPVC Section VIII.

H. Finish: The deaerator is to be painted with a high temperature (400°F minimum), silicone-based enamel.

2.2 DEAERATOR TRIM (ACCESSORIES)

A. The deaerator is to be fully trimmed by the manufacturer including the following:
   1. Safety Valve(s): ASME labeled and sized to relieve full capacity of pressure-reducing valve.
   2. Lifting eyes.

3. Pump suction piping with vortex breaker, isolation valve, strainer, and flexible connector.
4. Pump discharge piping with check valve, isolation valve, and pressure gauge graduated in pounds-force per square inch.
5. Pump-discharge bypass relief valve with orifice sized to provide continuous pump operation with boiler feedwater valve closed.
6. Tank Overflow Drain: Sized to relieve full capacity at operating pressure.
7. Tank Overflow Steam Trap: Float-type trap, sized to relieve full capacity at operating pressure, with steel housing and stainless-steel float ball.
8. Drum level transmitter with PID loop control mounted to the vessel and wired to work seamlessly with makeup water valve.
9. Makeup Water: Modulating valve for field mounting with water-level controller factory mounted on tank. (Optional) Provide three-valve bypass and inlet strainer with blowdown valve for field mounting, include a ½" NPT connection upstream and downstream and provide gauges to measure pressure before and after. Equip strainer with a drain to remove pressure for servicing.
10. Alarms: High-water-level alarm switch, low-water-level alarm switch, low water cut-off and one alarm bell with silence switch.
11. Vents: Manual and automatic vent valves.
    a. Manual air vents shall have an orifice to provide continuous venting at a rate of up to 0.1 percent of rated deaerator capacity at operating pressure indicated.
    b. (Optional) Automatic air vents shall be thermostatically controlled to provide a fast means of venting when a sudden buildup of gas occurs.
12. Pressure Reducing Valve: A self-contained pilot operated valve with pressure pilot shall be supplied to reduce the available steam pressure to the operating pressure of the deaerator. The valve to be shipped loose for field installation.
13. Water Level Indicator:
    a. Gauge Glasses: Overlapping glasses if multiple glasses are utilized. Provide automatic offset-type gage valves that stop the flow if a glass is broken. Drain cock on lower gage valve. Gage glass protecting rods.

b.(Optional) Magnetic Float-Flag Type Water Level Gauge: a. Tubular level gauge with internal float using concentric magnet with stiffening rings. Float sequentially actuates magnetic flags to indicate water level.

14. Gauges: Thermometer and pressure gauges graduated in pounds-force per square inch accurate to ± 1% of span, Gauges shall be panel mounted easily readable by operator standing at grade adjacent to unit.
15. Vacuum Breaker: Sized by deaerator manufacturer to protect unit. Bronze body construction with stainless steel internal trim, Buna-S rubber poppet and an atmospheric vent.
16. Provision for chemical injection quill.
17. Sample valve for sample cooler piping connection.
18. (Optional) Companion flanges.

B. Pump(s): Vertical multistage centrifugal, direct-coupled, vertical shaft, in-line, base-mounted, motor-driven.
   1. A total of ___ boiler feed pumps shall be furnished. Pump to be electric motor driven and to have a capacity of _____ gpm with a discharge pressure of ___ psig.
   2. Motors shall be non-overloading type of sufficient horsepower, TEFC, suitable for operation on 3 phase, 60 cycle, _____ volts, AC. Sealing and/or cooling water shall be provided in accordance with pump manufacturer's recommendations.
   3. Pump size shall be based on job requirements and/or the pump schedule and must deliver pressure at least 3% above the boiler relief valve setting to comply with ASME code.

C. (Optional) Platform and Ladder: Provide OSHA approved handrails, guardrails, platforms, and ladders for inspection and maintenance of the tank.