

Specification for Pharmaceutical Steam Generator

List of Enclosures

Attachment 1: Steam Generator Connection Locations – Top View

1. SCOPE

This specification describes the minimum requirements for procurement of a pharmaceutical steam generator (typically referred to as "Clean Steam Generator" or "Pure Steam Generator"), a feed water pump for the pharmaceutical steam generator, and a programmable logic controller, which controls both the feed water pump and pharmaceutical steam generator. The pharmaceutical steam generator, feed water pump, and programmable logic controller will be used at Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS&IMF) in Bremerton, WA.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on the date of an invitation for bids shall apply.

2.1 Attachment 1: Steam Generator Connection Locations – Top View

2.2 American National Standards Institute, Inc. (ANSI)

2.2.1 Z49.1, Safety in Welding, Cutting, and Allied Processes

2.2.2 Z535.4, Product Safety Signs and Labels

2.3 American Society of Mechanical Engineers (ASME)

2.3.1 ASME AG-1 – Code on Nuclear Air and Gas Treatment

2.3.2 ASME BPVC – Boiler and Pressure Vessel Code

2.3.3 ASME B16.5 – Pipe Flanges and Flanged Fittings

2.3.4 ASME B16.9 – Factory-Made Wrought Butt welding Fittings

2.3.5 ASME B36.19M – Stainless Steel Pipe

2.3.6 ASME B31.1 – Power Piping

2.4 American Society for Testing and Materials (ASTM)

2.4.1 A182/A182M – Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service, Standard Specification for

2.5 American Welding Society (AWS)

2.5.1 D1.1 – Structural Welding Code - Steel

2.5.2 D1.3 – Structural Welding Code - Sheet Steel

2.5.3 D1.6 – Structural Welding Code - Stainless Steel

2.5.4 D9.1 – Welding, Soldering and Brazing of Sheet Metal

2.5.5 D18.1 – Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications, Specification for

2.5.6 D18.3 – Welding of Tanks, Vessels, and Other Equipment in Sanitary (Hygienic) Applications, Specification for

2.6 Code of Federal Regulations (CFR)

2.6.1 21 CFR - Current Good Manufacturing Process (cGMP) Design and Construction Practices – US Food and Drug Administration (FDA)

2.7 National Electrical Manufacturers' Association (NEMA)

2.7.1 ICS 1 – Industrial Controls and Systems

2.7.2 ICS 4 – Application Guideline for Terminal Blocks

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2.7.3 MG-1 – Motors and Generators

2.8 National Fire Protection Association (NFPA)

2.8.1 NFPA 70 – National Electric Code (NEC)

2.8.2 NFPA 79 – Electrical Standards for Industrial Equipment

2.8.3 NFPA 101 – Life Safety Code

2.9 Military Standards

2.9.1 MIL-L-24131 – Lubricant, Colloidal Graphite in Isopropanol

3. DESIGN REQUIREMENTS

3.1 This specification provides the minimum procurement requirements for the pharmaceutical steam generator, feed water pump, and programmable logic controller (PLC). The steam generator will receive water from the feed water pump. The feed water pump will supply water at a rate based off the water level in the steam generator as controlled by the PLC.

3.2 Pharmaceutical Steam Generator (Steam Generator)

3.2.1 The steam generator shall produce steam continuously at 45 pounds per square inch (psi) gage.

3.2.1.1 The generated steam rate shall be variable from 5 gallons per hour (gph) (approximately 30 pounds per hour [lbs/hr]) to 100 gph (approximately 800 lbs/hr).

3.2.2 The steam generator's service steam operating pressure is 125 (+/- 25) psi gage. Maximum service steam supply rate for steam generator is 1200 lbs/hr.

3.2.3 The steam generator shall be equipped with a continuous and automated bottom blowdown line (drain line).

3.2.3.1 The drain line shall have an integrated needle valve designed to allow operators to adjust continuous bottom blowdown rate.

3.2.3.2 The continuous blowdown rate shall be variable from 0.5 gph to 10 gph.

3.2.3.3 The blowdown water from the steam generator shall be cooled to less than 110 degrees Fahrenheit (°F) by the feed water supply to the steam generator.

3.2.4 The following connections to the steam generator shall be flanged:

3.2.4.1 Service steam inlet – horizontal connection

3.2.4.2 Service steam outlet (condensate return) – horizontal connection

3.2.4.3 Feed water inlet (from feed water pump) – horizontal connection

3.2.4.4 Generated steam outlet – vertical connection

3.2.4.5 Drain line (bottom blowdown line) – horizontal connection

3.2.5 See Attachment 1: Steam Generator Connection Locations for orientation and approximate location of connections.

3.2.6 The steam generator shall utilize a single or double tube sheet design.

3.2.7 The steam generator shall have a moisture separator to capture entrained water droplets.

3.2.8 The steam generator shall be a 100% drainable design that leaves no standing water.

3.2.9 Permanently mount the steam generator within a stainless steel frame.

3.3 Frame for the Steam Generator

3.3.1 Construct steam generator frame of square stainless steel 304 tubing.

3.3.2 Maximum overall size for the steam generator, PLC, and frame shall be 48 inch depth x 60 inch width x 90 inch height.

3.3.2.1 A majority of the components shall fit within the frame.

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- 3.3.3 Do not install components or equipment within 8 inches from the top four corners of the frame.
 - 3.3.3.1 The steam generator will be transported via crane by lifting with straps wrapped around each of the top four corners of the frame.
 - 3.3.4 Design the frame to have a safety factor of at least 5 to 1 based on yield strength when lifting with straps secured to the upper four corners.
 - 3.3.5 The frame shall have a minimum 12 gauge thick, 6 inch deep, integrated stainless steel drip tray at the bottom and be of continuously welded construction. Skip welds are not allowed on drip tray.
 - 3.3.6 Equip the frame with bolt-on seismic hold downs to secure the frame to a concrete floor and resist appropriate seismic forces for Bremerton, WA.
 - 3.3.7 Equip the frame with built in forklift tubes for movement with a standardized pallet jack. The width of each fork is 7 inches. The dimension between the outer edges of the forks is 27 inches, with a fork length of 48 inches. The forklift tubes shall be accessible from the front of the frame as designated in Attachment 1.
- 3.4 Feed Water Pump (Pump)**
- 3.4.1 The feed water pump shall be a self-priming, sanitary pump with all wetted components 316L stainless steel.
 - 3.4.2 The water supply for the pump is stored in a tank, vented to atmosphere, with negligible static head, and at the same elevation. The water supply temperature is 70 (+/- 10) degrees Fahrenheit (°F).
 - 3.4.3 The pump shall be capable of supplying the steam generator up to 150 feet away at the same elevation.
 - 3.4.4 The pump shall be sized to supply adequate water pressure at the steam generator through a stainless steel pipe one (1) inch nominal pipe size (NPS) pipe.
 - 3.4.4.1 PSNS&IMF will provide and install piping between the pump and steam generator using flanged and/or welded connections.
 - 3.4.4.2 The piping between the pump and the steam generator may contain up to twenty 90 degree elbows.
 - 3.4.5 The pump inlet and outlet shall have flanged connections configured per ASME B16.5.
 - 3.4.6 The pump may be powered from the steam generator's power or from a separate power supply.
 - 3.4.7 The pump shall be controlled by the PLC at the steam generator.
 - 3.4.7.1 PSNS&IMF will supply and connect control circuit wiring to vendor provided terminal blocks at pump and PLC.
 - 3.4.8 The pump shall be mounted to a skid.
 - 3.4.8.1 Maximum overall size for the skid shall be 24 inch width x 36 inch length x 36 inch height.
 - 3.4.8.2 The skid shall be constructed of 304 stainless steel and be capable of lifting with straps.
 - 3.4.8.3 The skid shall function as a drip tray with minimum 12 gauge thick, 6 inch sides, and be of continuously welded construction. Skip welds are not allowed on drip tray.
 - 3.4.8.4 Equip the skid with bolt-on seismic hold downs to secure the skid to a concrete floor and resist appropriate seismic forces for Bremerton, WA.
- 3.5 Programmable Logic Controller (PLC)**
- 3.5.1 The PLC shall be Allen Bradley or equivalent.
 - 3.5.1.1 Equip the PLC with 4-20 milliamps (mA) input and output connections for remote display and control of PLC.

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- 3.5.2 PLC shall be located on the steam generator frame and mounted at a convenient height for operators.
- 3.5.3 PLC shall control as a minimum:
 - 3.5.3.1 Feed Water Pump (on-off, with variable speed)
 - 3.5.3.2 Steam Generator Liquid Level
 - 3.5.3.3 Bottom Blowdown Valve (open-closed, with variable flow rate)
 - 3.5.3.4 Service Steam Inlet Valve (open-closed, with variable flow rate)
- 3.5.4 PLC shall display as a minimum:
 - 3.5.4.1 Steam Generator temperature (°F)
 - 3.5.4.2 Steam Generator pressure (psi)
 - 3.5.4.3 Steam Generator liquid level (inches)
 - 3.5.4.4 Generated Steam temperature (°F)
 - 3.5.4.5 Generated Steam pressure (psi)
 - 3.5.4.6 Inlet Service Steam temperature (°F)
 - 3.5.4.7 Inlet Service Steam pressure (psi)
 - 3.5.4.8 Feed Water flow rate (gph)
 - 3.5.4.9 Feed Water temperature (°F)
 - 3.5.4.10 Outlet Blowdown flow rate (gph)
 - 3.5.4.11 Operation Status: start-up, normal, and shut-down
 - 3.5.4.12 Alarm Conditions
- 3.5.5 PLC shall provide automatic diagnostics to monitor level controls for correct operation and shutdown of the steam generator.
- 3.5.6 PLC shall provide automatic high and low liquid level steam generator shutdown capability.
- 3.5.7 PLC shall be on front of frame. See Attachment 1.

4. GENERAL REQUIREMENTS

4.1 Construction and Materials

- 4.1.1 Construct pressure vessels per ASME BPVC Section VIII Division 1.
- 4.1.2 All flanged connections shall be configured per ASME B16.5 with material per ASTM A182/A182M.
- 4.1.3 All wetted components and surfaces shall be constructed of 316L stainless steel.
- 4.1.4 Frame, skid, drip trays, pipe hangers, and other components shall be 304 stainless steel.
 - 4.1.4.1 Bolts, hex cap screws, and studs shall be stainless steel.
 - 4.1.4.2 Nuts shall be monel.
- 4.1.5 Use Neolube lubricant (colloidal graphite in isopropanol) per MIL-L-24131 on piping joints, as required for lubricant.
- 4.1.6 Use stainless steel Teflon tape on threaded pipe connections, as required for sealing.
- 4.1.7 Cap and/or blank all water/steam inlets and outlets on the pump and steam generator to ensure foreign material exclusion for shipment.
- 4.1.8 Piping shall be seamless.
- 4.1.9 Galvanized components and equipment are prohibited.
- 4.1.10 Asbestos containing components and equipment are prohibited.

4.2 Welding

- 4.2.1 All welding and workmanship shall comply with applicable AWS standards including, but not limited to: AWS D1.1, D1.3, D1.6, D9.1, D18.1 and D18.3.

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- 4.2.2 All welders must be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1; ASME Code for Pressure Piping B31; and AWS D1.1 Structural Welding Code, as appropriate. Records of qualifications shall be available for review upon request.
 - 4.2.3 All weld inspectors must be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1; ASME Code for Pressure Piping B31; and AWS D1.1 Structural Welding Code, as appropriate. Records of qualifications shall be available for review upon request.
 - 4.2.4 Pressure vessel welding shall be per ASME BPVC, Section VIII, Division 1, latest edition.
 - 4.2.5 Weld 316L stainless steel with 316L filler material.
- 4.3 Painting**
- 4.3.1 Paint is prohibited on stainless steel components.
 - 4.3.2 Lead based or chromium based paints are prohibited.
 - 4.3.3 Painted surfaces may include safety guards, motor enclosures, etc. and shall be painted in conformance with the manufacturer's standard practices and good workmanship. Painted surfaces shall result in a highly wear-resistant finish that guarantees continued protection to the surfaces in a heavy-duty industrial environment.
- 4.4 Operator Controls:**
- 4.4.1 Design gauges and instruments for recalibration.
 - 4.4.2 Outfit controls with suitable handles, pushbuttons, or control knobs, as applicable.
 - 4.4.3 Pressure gauges shall read out and be calibrated in the U.S. customary units of measurement.
 - 4.4.4 Mount controls, instrumentation, and indicators in a manner convenient to operating personnel.
 - 4.4.5 Label controls, instrumentation, and indicators clearly and legibly for function and identification.
- 4.5 Electrical**
- 4.5.1 All electrical equipment and components including motors, starters, relays, switches, wiring and their installation, shall conform to the latest versions of NFPA, NEC, NEMA, and ANSI standards.
 - 4.5.2 All electrical equipment must be tested by an OSHA Nationally Recognized Testing Laboratory or the unit as a whole must be Underwriters Laboratories (UL) listed by inspector.
 - 4.5.3 Mount electronics in stainless steel NEMA 4X rated electrical boxes.
 - 4.5.4 Power available at installation location (PSNS & IMF) is: 120/240 VAC single-phase, 60 Hz and 480 VAC three-phase 60Hz.
 - 4.5.5 Control circuits shall operate on a circuit of 120 volts or less.
 - 4.5.6 If the equipment is powered by greater than 120 volts, the control circuits shall derive power from isolation transformer integral with the equipment.
 - 4.5.7 Electric Motors shall be meet the following criteria:
 - 4.5.7.1 Totally Enclosed Fan Cooled (TEFC)
 - 4.5.7.2 Premium Efficiency
 - 4.5.7.3 Rated for continuous duty
 - 4.5.7.4 Sized for a service factor (SF) of 1.15
 - 4.5.7.5 Equipped with ball bearings
 - 4.5.7.6 Meet NEMA MG-1 requirements

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4.5.8 Grounding:

- 4.5.8.1 All exposed, non-current carrying metal parts on the equipment shall be maintained at common, zero ground potential.
- 4.5.8.2 Do not connect the primary circuits in the equipment to ground.
- 4.5.8.3 Provide a grounding stud/lug (sized for #8 wire or larger) on the equipment for grounding the equipment.
- 4.5.8.4 For cord connected equipment, a NEMA type grounding plug which effectively grounds the equipment for the safety of personnel is acceptable in lieu of a ground stud or lug on the equipment.

4.5.9 Over-current Protection:

- 4.5.9.1 All electrical circuits shall be fused or circuit breaker protected in each phase conductor for AC circuits and both DC circuit conductors.
- 4.5.9.2 Overloads, fuses, and circuit breakers shall be coordinated for minimum circuit disruption within the constraints of the latest version of NEC.

4.6 Identification Plate

4.6.1 A corrosion resistant identification plate shall be affixed to the steam generator in the vicinity and the same manner as the ASME nameplate, showing:

- 4.6.1.1 Manufacturers Name
- 4.6.1.2 Model (i.e. "Pharmaceutical Steam Generator")
- 4.6.1.3 Serial Number
- 4.6.1.4 Year of Manufacture
- 4.6.1.5 Total Weight
- 4.6.1.6 Contract Number
- 4.6.1.7 Other pertinent information for identifying the part as a unique component .

4.6.2 Nameplates for electrical apparatus shall follow applicable NEMA Standards.

5. OTHER ADDITIONAL REQUIREMENTS

5.1 **Usage and Environment** - The steam generator, pump, and associated components will be operated in a heavy-duty industrial environment and shall be capable of continuous use.

- 5.1.1 Indoor Temperature Range: 45 to 100 °F
- 5.1.2 Relative Humidity: up to 100% non-condensing

5.2 **Safety Signs and Labels** - Safety signs and labels in accordance with ANSI Z535.4 shall be securely attached to the equipment in visible locations, with any safety precautions to be observed by the operator or maintenance personnel permanently marked on the signs.

5.3 PCB Certification & Label Plate

- 5.3.1 The Vendor shall provide written certification that the equipment contains no detectable PCBs (less than two (2) parts-per-million). The certification shall be on manufacturer's letterhead and signed by a company official who is empowered to provide same.
- 5.3.2 A label plate containing the PCB Certification information shall be permanently affixed to the steam generator in the vicinity of the manufacturer's identification plate. The PCB certification label shall be engraved or etched on wear and corrosion resistant material.

5.4 Energy Isolating Devices

- 5.4.1 The equipment shall be provided with energy isolating devices (e.g., power switches, safety switches, circuit breakers, valves) that protect personnel from the release of hazardous energy. This includes both mechanical and electrical devices.

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- 5.4.2 The devices shall be designed and manufactured such that they can be padlocked in the user-selected position of “OFF” (“CLOSED”) to prevent inadvertent or unauthorized charge.
- 5.5 Standard, Off-The-Shelf Materials, Parts and Components**
- 5.5.1 All materials, parts and components comprising the steam generator, pump, and PLC shall be new, of current design and manufacture, and shall not have been in prior service except as required for factory testing.
- 5.5.2 Subcomponents listed in the requirements shall be that manufacturer’s current production models which, on the day this solicitation is issued, have been designed, engineered and sold, or are being offered for sale through advertisements or manufacturer’s published catalogs and brochures.
- 5.6 Safety Devices**
- 5.6.1 All machine parts, components, mechanisms, and assemblies furnished shall comply with all specific requirements of “OSHA Safety and Health Standard (29 CFR 1910), General Industry” that are applicable to the equipment itself.
- 5.6.2 Covers, belt guards, and other safety devices shall be provided for all parts of the equipment that present a safety hazard.
- 5.6.3 High temperature equipment and piping exposed to contact by personnel shall be properly guarded or covered with insulation or physical barrier material
- 5.6.4 The safety devices shall prevent unintentional contact with the guarded part.
- 5.6.5 The safety devices shall not interfere with the operation or maintenance of the equipment.
- 5.6.6 The safety devices shall be removable to facilitate inspection, maintenance and repair of the part.
- 5.7 Environmental Protection** - The equipment shall be designed and constructed so that during the operation and transportation the equipment will comply with all applicable Environmental Protection Agency (EPA), Occupational Safety and Health Agency (OSHA) and State of Washington Department Of Ecology (WDOE) restrictions for materials classified as hazardous to the environment in effect on the date of the contract. The equipment described herein shall not contain or emit material hazardous to the ecological system as prescribed by federal, state and local statutes in effect at the point of installation.
- 5.8 Low Noise Emission Equipment** - The Vendor shall make the maximum use of low-noise emission equipment as certified by the Environmental Protection Agency. The Vendor shall provide hazardous noise signs and label equipment, wherever work procedures and equipment produce sound-pressure levels greater than 84 dB(A) steady state and/or 140 dB peak sound pressure level for impact or impulse noise, regardless of the duration of the exposure.
- 5.9 Environmental, Safety and Health Requirements**
- 5.9.1 Hazardous Material – Supplies used in the performance of this contract, or materials being provided as part of the equipment shall be free of known hazardous materials. Definitions of hazardous materials are specified in the latest version, including revisions adopted during the term of the contract, of Federal Standard No. 313.
- 5.9.2 Any hazardous material, radioactive materials or instruments capable of producing ionizing radiation as well as materials which contain asbestos, mercury, methylene chloride, lead, or polychlorinated biphenyls are prohibited.
- 5.9.3 Class I Ozone Depleting Substances as defined in 40 CFR Part 82 shall not be used in the performance of this contract, or be provided as part of the equipment.

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- 5.10 **Restricted Colors** – PSNS&IMF uses the colors magenta, yellow, red and blue to identify specially controlled materials. The vendor is specifically prohibited from using magenta, yellow, red or blue colored plastic wrapping materials or bags, tape, or other covering materials.
- 5.11 **OSHA Certification Report** - The equipment installation and its component parts shall be in compliance with the applicable OSHA regulations in accordance with CFR Title 29, Chapter XVII, Part 1910 and installed in accordance with NEC/NFPA requirements. Approval shall be as specified under the “Approval” and “Acceptance” criteria in the OSHA regulations Subpart “O”, Machinery and Machine Guarding paragraph 1910.212 and Subpart “S” Electrical, paragraph 1910.303 and paragraph 1910.399. After equipment delivery and installation, and prior to testing, the Vendor shall provide an OSHA Certification Report. Failure to provide this certification report will delay acceptance of the equipment, and could result in rejection for failure to comply with the terms of the contract. This report documents the results of all tests performed, provides an assessment of the equipment performance for compliance with the contract requirements, and forms a basis for recommending a safety certification. The report, test and evaluation shall be a composite of those inspection requirements specified in the contract. The report shall be prepared in an orderly manner to clearly and accurately set forth the collected data and conclusion resulting from these inspection requirements, opinions and subjective conclusions shall be clearly identified. The report shall include, but is not limited to, the following:
- 5.11.1 List all tests performed and by whom witnessed.
 - 5.11.2 List of data used for evaluation.
 - 5.11.3 Tabulation of all discrepancies related to specification performance requirements.
 - 5.11.4 Description of limitations revealed by data utilized.
 - 5.11.5 Actions taken to mitigate each discrepancy and limitation.
 - 5.11.6 Recommendations for subsequent actions.
 - 5.11.7 Summary conclusions.
 - 5.11.8 Manufacturer Certification that equipment has been manufactured and installed to OSHA CFR 1910.399 (per definition of “acceptable”).
6. **VENDOR RESPONSIBILITIES:**
- 6.1 Design, fabricate, and assemble all equipment and components as needed to provide one pharmaceutical steam generator, one feed water pump and one programmable logic controller as specified herein.
 - 6.2 Vendor is required to provide copy of current ASME Certification with bid package.
 - 6.3 **Deviations** – Design, fabrication, construction, and operation must comply with this bid specification.
 - 6.4 **Responsibility for Compliance**
 - 6.4.1 All items shall meet requirements of this bid specification. The requirements set forth in this specification shall become part of the vendor’s overall inspection or quality program.
 - 6.4.2 The absence of any inspection requirements in the specification shall not relieve the vendor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract.
 - 6.4.3 Vendor inspections, as part of manufacturing operations, are an acceptable practice to ascertain conformance to requirements; however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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- 6.5 **Warranty** – Supplies and services furnished shall be covered by warranty from defects in design, materials and workmanship. The warranty shall be the manufacturer’s standard commercial warranty which shall conform to all the requirements of the contract. Acceptance of the manufacturer’s standard commercial warranty shall not minimize the rights of the Government under clauses in the contract, and in any conflict that arises between the terms and conditions of the contract and manufacturer’s warranty, the terms and conditions of the contract shall take precedence. The warranty period shall commence when final acceptance has been achieved as determined when all contract line item numbers have been processed through Wide Area Workflow (WAWF).

7. PRE-AWARD (BID-PACKAGE) SUBMITTAL REQUIREMENTS

7.1 Technical Point of Contact (Technical POC):

- 7.1.1 To be released at award.

7.2 Descriptive Literature and Preliminary Fabrication Drawings

- 7.2.1 As part of the pre-award submittal, the vendor shall provide descriptive literature (e.g. performance specifications and charts) of the make and model being proposed for all of the systems and components specified herein. Submissions will be evaluated for technical acceptability by the PSNS&IMF Technical POC.
- 7.2.2 As part of the pre-award submittal, the vendor shall provide preliminary fabrication drawings. Submissions will be evaluated for technical acceptability by PSNS&IMF Technical POC.

7.3 Service Connection Sizes

- 7.3.1 State the size of connection for inlet of water supply to feed water pump.
- 7.3.2 State the size of connection for outlet of generated steam from the steam generator.
- 7.3.3 State the size of connection for inlet of service steam to the steam generator.
- 7.3.4 State the size of connection for outlet of outlet of service steam from the steam generator.
- 7.3.5 State the expected electrical service requirements for the steam generator, pump, and PLC.

8. POST-AWARD REQUIREMENTS

8.1 Fabrication Requirements

- 8.1.1 Prior to start of fabrication, the vendor shall provide a detailed sketch of the steam generator and all engineering calculations. The PSNS&IMF Technical POC shall have ten (10) working days to review and approve the sketches and calculations.

8.2 Documentation Requirements for Technical Data

- 8.2.1 Documentation shall have U. S. customary units of measurement.
- 8.2.2 Documentation shall consist of two paper copies and one electronic copy (PDF format on a CD/DVD) of all documentation.
- 8.2.3 Documentation shall be provided to the PSNS&IMF Technical Point of Contact.

8.3 Provide the Following Technical Data at Delivery

- 8.3.1 Installation instructions, information, and drawings for:
- 8.3.1.1 Securing/anchoring the steam generator and pump skid to the concrete floor
 - 8.3.1.2 Connecting control circuitry from the pump to the PLC
- 8.3.2 Operation, Repair and Maintenance Instructions and Information:
- 8.3.2.1 Control System Documentation and Operation Procedures - Include detailed technical manual for programming and customizing control loops and algorithms.

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- 8.3.2.2 Normal Operating Procedure, Safety Precautions, Startup, Shutdown, and Post-Shutdown Procedures Emergency Operations, Operator Service Requirements, Manufacturer's Instructions
- 8.3.2.3 Preventive Maintenance Plan and Schedule, Corrective Maintenance (Repair), Troubleshooting and Diagnostic Techniques, Maintenance and Repair Procedures, Parts Identification, Cleaning Recommendations
- 8.3.3 Other Required Information:
 - 8.3.3.1 Final "As Built" Drawings
 - 8.3.3.2 Piping and Instrumentation Drawings
 - 8.3.3.3 Electrical: Wiring, Control and One-Line Diagrams
 - 8.3.3.4 Electrical and Mechanical Component Parts List and Catalog Cut Sheets
 - 8.3.3.5 Product Data Sheets for any paints and chemicals used on the steam generator, pump, and PLC.
 - 8.3.3.6 Material Safety Data Sheets (MSDS) for any paints and chemicals used on the steam generator, pump, and PLC.
 - 8.3.3.7 Testing and Performance Data
 - 8.3.3.8 Pressure Vessel Certification and Data Sheet –The vendor shall provide a signed, written certification of compliance from the manufacture to the requirements of - ASME - Section VIII coded tank for any pressure vessel supplied as part of this equipment. Included shall be two (2) copies of the Manufacturers Data Report for Pressure Vessels, Form U-1A.

