

Specification for Steam Superheater

1. SCOPE

This specification describes the minimum requirements for procurement of a steam superheater. The steam superheater 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 American National Standards Institute, Inc. (ANSI)

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

2.1.2 Z535.4, Product Safety Signs and Labels

2.2 American Society of Mechanical Engineers (ASME)

2.2.1 ASME BPVC – Boiler and Pressure Vessel Code

2.2.2 ASME B16.5 – Pipe Flanges and Flanged Fittings

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

2.2.4 ASME B36.19M – Stainless Steel Pipe

2.2.5 ASME B31.1 – Power Piping

2.3 American Society for Testing and Materials (ASTM)

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

2.4 American Welding Society (AWS)

2.4.1 D1.1 – Structural Welding Code - Steel

2.4.2 D1.6 – Structural Welding Code - Stainless Steel

2.5 Code of Federal Regulations (CFR)

2.5.1 21 CFR - Current Good Manufacturing Process (cGMP) Design and Construction Practices – US Food and Drug Administration (FDA)

2.5.2 29 CFR Part 1910 – Applicable Standards as required

2.6 National Electrical Manufacturers' Association (NEMA)

2.6.1 ICS 1 – Industrial Controls and Systems

2.7 National Fire Protection Association (NFPA)

2.7.1 NFPA 70 – National Electric Code (NEC)

2.7.2 NFPA 79 – Electrical Standards for Industrial Equipment

2.7.3 NFPA 101 – Life Safety Code

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3. DESIGN REQUIREMENTS

3.1 This specification provides the minimum procurement requirements for a steam superheater and associated parts and components.

3.2 Steam Superheater

3.2.1 The supply steam for the superheater has the following characteristics:

3.2.1.1 Pressure of 45 (+/-5) pounds per square inch (psi) gage

3.2.1.2 Temperature of 320 (+/-30) degrees Fahrenheit (°F)

3.2.1.3 Variable flow rate from 5 gallons per hour (gph) (approximately 40 pounds per hour [lbs/hr]) to 50 gph (approximately 400 lbs/hr)

3.2.1.4 Saturated steam with 1% moisture (quality factor of 0.99) produced from deionized water

3.2.2 The superheater shall produce steam with variable temperature from 350 °F to 700 °F

3.2.3 The minimum size for the superheater shall be 20 kilowatt.

3.2.4 A multi-stage superheater unit is acceptable.

3.2.5 Pass through design (i.e. steam can pass through superheater with superheater off without causing damage) or built in by-pass.

3.2.6 The superheater shall include a safety relief valve.

3.2.7 The superheater shall include a drain connection.

3.2.8 Construct per ASME BPVC Section VIII, Division 1.

3.2.9 The superheater inlet, outlet, and drain shall be stainless steel flanged connections, configured per ASME B16.5 with material per ASTM A182/A182M.

3.2.10 All wetted components and surfaces shall be constructed of 316L stainless steel.

3.2.11 The superheater shall be designed for installation in both vertical and horizontal orientations.

3.2.12 The superheater shall be mounted to a stainless steel 304 frame/skid.

3.2.13 Maximum overall size shall be 36 inch depth x 48 inch x 90 inch.

3.3 Frame/Skid for Superheater

3.3.1 The frame/skid shall be capable of being secured in two ways: 1) mounted to a concrete wall and 2) secured to a concrete floor as a standalone structure.

3.3.2 The frame/skid shall be equipped with bolt-on seismic anchors to resist appropriate seismic forces for Bremerton, WA.

3.4 Control Panel

3.4.1 The superheater shall be equipped with a control panel to control the outlet steam temperature.

3.4.2 The control panel will be mounted up to 30 feet away from the superheater. The Vendor shall provide the wiring.

3.4.3 The control panel shall have the following capabilities:

3.4.3.1 Automatic high temperature shutdown

3.4.3.2 Automatic high pressure shutdown

3.4.3.3 Full modulation of kilowatt capacity of superheater via a Silicon Control Rectifier (SCR)

3.4.3.4 On-Off Control switch for superheater.

3.4.3.5 Power "On" light.

3.4.4 The control panel shall display as a minimum:

3.4.4.1 Outlet Steam temperature (°F)

3.4.4.2 Superheater internal temperature (°F)

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- 3.4.4.3 Superheater internal pressure (psi)
- 3.4.4.4 Power Demand/Consumption
- 3.4.4.5 Operation Status: start-up, normal, and shut-down
- 3.4.4.6 Alarm Conditions
- 3.4.5 The control panel shall be capable of being mounted to the superheater frame/skid and mounted to a concrete wall.

3.5 Construction and Materials

- 3.5.1 Frame, pipe hangers, and other components shall be 304 stainless steel.
 - 3.5.1.1 Bolts, hex cap screws, studs, and lock washers shall be stainless steel.
 - 3.5.1.2 Nuts shall be monel.
- 3.5.2 Cap and/or blank steam inlets and outlets to ensure foreign material exclusion for shipment.
- 3.5.3 All piping shall be seamless.
- 3.5.4 Galvanized components and equipment are prohibited.
- 3.5.5 Asbestos containing components and equipment are prohibited.

4. GENERAL REQUIREMENTS

4.1 Welding

- 4.1.1 All structural welding and workmanship shall comply with applicable AWS standards including, but not limited to: AWS D1.1 and D1.6.
- 4.1.2 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.
- 4.1.3 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.
- 4.1.4 Pressure vessel welding shall be per ASME BPVC, Section VIII, Division 1, latest edition.
- 4.1.5 Weld 316L stainless steel with 316L filler material.

4.2 Painting

- 4.2.1 Paint is prohibited on stainless steel components.
- 4.2.2 Lead based or chromium based paints are prohibited.
- 4.2.3 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.

4.3 Operator Controls

- 4.3.1 Design gauges and instruments for recalibration.
- 4.3.2 Outfit controls with suitable handles, pushbuttons, or control knobs, as applicable.
- 4.3.3 Pressure gauges shall read out and be calibrated in the U.S. customary units of measurement.
- 4.3.4 Mount controls, instrumentation, and indicators in a manner convenient to operating personnel.
- 4.3.5 Label controls, instrumentation, and indicators clearly and legibly for function and identification.

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4.4 Electrical

- 4.4.1 All electrical equipment including relays, switches, wiring and their installation, shall conform to the latest versions of NFPA, NEC, NEMA, and ANSI standards.
- 4.4.2 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.
- 4.4.3 Mount electronics in stainless steel NEMA 4X rated electrical boxes.
- 4.4.4 Power available at installation location (PSNS & IMF) is: 480 VAC three-phase 60Hz.
- 4.4.5 The control circuits shall derive power from isolation transformer integral with the equipment and operate on a circuit of 120 volts or less.
- 4.4.6 Grounding:
 - 4.4.6.1 All exposed, non-current carrying metal parts on the equipment shall be maintained at common, zero ground potential.
 - 4.4.6.2 Do not connect the primary circuits in the equipment to ground.
 - 4.4.6.3 Provide a grounding stud/lug (sized for #8 wire or larger) on the equipment for grounding the equipment.
 - 4.4.6.4 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.
- 4.4.7 Over-current Protection:
 - 4.4.7.1 All electrical circuits shall be fused or circuit breaker protected in each phase conductor for AC circuits and both DC circuit conductors.
 - 4.4.7.2 Overloads, fuses, and circuit breakers shall be coordinated for minimum circuit disruption within the constraints of the latest version of NEC.

4.5 Identification Plate

- 4.5.1 A corrosion resistant identification plate shall be affixed to the steam super heater in the vicinity and the same manner as the ASME nameplate, showing as a minimum:
 - 4.5.1.1 Manufacturers Name
 - 4.5.1.2 Model
 - 4.5.1.3 Serial Number
 - 4.5.1.4 Year of Manufacture
 - 4.5.1.5 Total Weight
 - 4.5.1.6 Contract Number
- 4.5.2 Nameplates for electrical apparatus shall follow applicable NEMA Standards.

5. OTHER ADDITIONAL REQUIREMENTS

- 5.1 **Usage and Environment** - The steam superheater and associated equipment 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 Indoor Relative Humidity: up to 90% 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.

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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 superheater 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.
- 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 and/or unauthorized charge.

5.5 Standard, Off-The-Shelf Materials, Parts and Components

- 5.5.1 All materials, parts, and components 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 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, 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.

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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.
- 5.10 **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** - 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.
- 5.11.1 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, assemble, and then deliver the equipment and components as needed to provide one steam superheater 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, Preliminary Fabrication Drawings, ASME Certification

- 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 the system 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.
- 7.2.3 As part of the pre-award submittal, the vendor shall provide documentation of their original ASME Certificate and current ASME Certificate.

7.3 Service Connection Sizes

- 7.3.1 State the size of the steam inlet connection to the steam superheater.
- 7.3.2 State the size of the steam outlet connection from the steam superheater.
- 7.3.3 State the electrical service requirements for the steam superheater.

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 superheater 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 Provide the Following Technical Data at Delivery

- 8.2.1 Two paper copies and one electronic copy (PDF format on a CD/DVD) of all documentation.
- 8.2.1.1 Use U. S. customary units of measurement.
- 8.2.1.2 Deliver to the PSNS&IMF Technical Point of Contact.
- 8.2.2 Installation instructions for securing/anchoring the steam superheater and control panel.
- 8.2.3 The operation, repair, and maintenance information shall include as minimum the following:
- 8.2.3.1 Normal Operating Procedure
- 8.2.3.2 Startup, Shutdown, and Post-Shutdown Procedures
- 8.2.3.3 Safety Precautions and Emergency Operations
- 8.2.3.4 Preventive Maintenance Plan and Procedures
- 8.2.3.5 Troubleshooting and Diagnostic Techniques
- 8.2.3.6 Parts Identification

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8.2.4 Other Required Information:

- 8.2.4.1 Final "As Built" Drawings
- 8.2.4.2 Electrical: Instrumentation Controls, Wiring, and One-Line Diagrams
- 8.2.4.3 Electrical and Mechanical Component Parts List and Catalog Cut Sheets
- 8.2.4.4 Testing and Performance Data
- 8.2.4.5 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.
- 8.2.4.6 Product Data Sheets for any paints and chemicals included.
- 8.2.4.7 Material Safety Data Sheets (MSDS) for any paints and chemicals included.