

**SECTION 23 53 13**  
**SURGE RECEIVER TANK AND BOILER FEEDWATER PUMPS**

**PART 1 – GENERAL**

**1.01 REFERENCE STANDARDS**

- A. ASME B31.1 - Power Piping; 2024.
- B. ASME B31.9 - Building Services Piping; 2025.
- C. ASME BPVC - Boiler and Pressure Vessel Code; 2023.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.02 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.03 SUMMARY**

- A. This Section includes the following:
  - 1. Pre-packaged feedwater pumps and an atmospheric surge receiver tank with packaged power and controls with a single point power connector.

**1.04 DEFINITION**

- A. NPSH: Net-positive suction head.

**1.05 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated. Include rated capacity, temperature and NPSH required, pump performance curves with selection points clearly indicated, and furnished specialties and accessories.
- B. Shop Drawings: Include plans, elevations, sections, details, dimensions, weights, loadings, required clearances, method of field assembly, and attachments to other work.
  - 1. Wiring Diagrams: Power, signal, and control wiring.
  - 2. Physical Diagrams: Layout and Dimensions.
  - 3. Piping, Pumps, Tank and all devices on a piping and Instrumentation Diagram.

**1.06 INFORMATIONAL SUBMITTALS**

- A. Manufacturer Seismic Qualification Certification: Submit certification that feedwater equipment, accessories, and components will withstand seismic forces defined in
  - 1. Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment." Include the following:
  - 2. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
    - a. The term "withstand" means "the unit will remain in place without separation of internal and external parts during a seismic event and the unit will be fully operational after the event."
  - 3. Dimensioned Outline Drawings of Equipment: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 4. Detailed description of equipment anchorage devices on which certification is based and their installation requirements.
- B. Field quality-control test reports.

**1.07 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For feedwater equipment to include in emergency, operation, and maintenance manuals.

## 1.08 QUALITY ASSURANCE

- A. Regulatory Requirements: Fabricate and test unit according to ASME PTC 12.1, "Closed Feedwater Heaters."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. ASME Compliance: ASME B31.1, "Power Piping," for systems more than 15 psig ASME B31.9, "Building Services Piping," for systems equal to or less than 15 psig. ASME BPVC Section VIII Pressure Vessels shall bear the appropriate ASME label.
- D. Commissioning of a system or systems specified in this section is part of the construction process. Documentation and testing of these systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with NYCHA and the Commissioning Agent (CxA). Project Closeout is dependent on successful completion of all commissioning procedures, documentation, and issue closure. Refer to Section 017700 Closeout Procedures, for closeout details. Refer to Section 019113 Project Commissioning Requirements, for detailed commissioning requirements.

## 1.09 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Shipping: Clean flanges and exposed-metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.
- B. Store units in dry location.
- C. Retain protective flange covers and machined-surface protective coatings during storage.
- D. Protect bearings and couplings against damage from sand, grit, and other foreign matter.
- E. Comply with manufacturer's written rigging instructions.

## 1.10 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

## 1.11 WARRANTY

- A. The Receiver/ Boiler Feedwater Pump Set will be provided with five (5) year material and labor warranty.

## PART 2 - PRODUCTS

### 2.01 ATMOSPHERIC SURGE TANK

- A. A. Manufacturer
  - 1. Industrial Steam.
    - a. Kansas City Deaerator
    - b. Cleaver Brooks
      - 1) B. Receiver
    - c. Furnish and install horizontal, prefabricated atmospheric feed system and tank with minimum capacity of 1,900 gallon measured to overflow.
    - d. The system shall have a steam sparge heating system to preheat feedwater to 180°F.
    - e. Approximately 50% of the load shall be make-up at 60°F and 50% of the load shall be pumped return at 120°F.
    - f. The storage vessel shall be Atmospheric with a 16" round manway for easy access to all internal components and inspection of the unit.
    - g. All make-up and low pressure or pumped return enter the surge tank.
    - h. Rated capacity of surge tank equal to or greater than 41,400#/hr.
    - i. Packaged unit must be shop assembled with level control and all electrical components tested prior to shipment.

- 1) Make-up Assembly
- 2) 1 Furnish a water make-up assembly with a capacity of 100 gallons per minute. Assembly shall consist of a properly sized electric modulating control valve for back-up water inlet, Electric modulating controller. The control valve shall be stainless steel trim and dead-end shut-off capability. The makeup assembly shall be factory pre-piped and shipped assembled. The level will be controlled by two factory-wired and programmed PID loop controllers factory wired to a differential pressure transmitter. DP transmitter shall be piped to low and high connection points on surge tank vessel by the manufacturer and tested under actual conditions. DP transmitter shall have local display and be HART compatible with 4-20mA output and field adjustable range. Self-contained or external float cage type make-up assemblies are not acceptable.
- 3) Temperature Control Heating System
  - (a) 1 Furnish a temperature control system with a capacity to raise the temperature of the water from 60°F to 180°F with 10 psig minimum steam supply at the regulator. The temperature control shall consist of a properly sized self-contained, pilot operated control valve and steam inlet y-strainer. The control valve shall have stainless steel trim and dead-end shutoff capability. The assembly shall include a submerged perforated copper heater tube of proper design to fully disperse steam and heat the water. The heater will have a double-tapped mounting bushing for easy removal of the heater tube.
- 4) Boiler Feed Pump
  - (a) Furnish three (3) end-suction, close-coupled boiler feed pumps each having the capacity of 104 GPM at 96' TDH. Each pump shall have 250°F mechanical seal and be close coupled to a 3500rpm, 208V, 3 phase, 60 cycle, 5 HP TEFC motor. The pumps shall not cavitate or overload motor at any time during normal operation. The pump shall have a low NPSH requirement which shall not be exceeded at any time during normal operation. Each pump is sized for 125% of the total boiler evaporation rate. The contractor shall be required to submit details of pump construction, head-capacity curves and NPSH requirements of the pump. Each pump shall have a bypass with an orifice that returns water to the surge tank.
  - (b) The pump suction shall have a shut-off valve; compression type coupling, and piping, each pump suction line should be individually run out of the receiver tank. Header type manifolds are not permitted.
  - (c) Each pump shall have a properly sized recirculating orifice piped back to the receiver and include a check and shut off valve. Loose orifices piped by the contractor shall not be acceptable.
  - (d) Each pump shall be controlled via a Variable Frequency Drive (w/full bypass). See Section 232923 for Variable Frequency Drive specifications.
- 5) Accessories
  - j. All of the following accessories shall be provided: a Pressure Gauge
    - 1) One 3" stainless steel temperature gauge with thermowell.
    - 2) Two 1/2" water gauge cocks, 5/8" red line glass and protector rods. d One drain valve.
    - 3) e High, low water and low-low water cutoff switches to panel. f Sentinel valve for pump protection.
    - 4) g Chemical feed injection quill.
    - 5) Control Panel and Pump Control
    - 6) 1 Furnish one main control and combination motor starters wired to common disconnect switch for single point connection. The enclosure shall be of steel and exterior shall be phosphatized, double prime coated and finished with an oven baked enamel. The panels shall be NEMA 4 construction. The main compartment shall house all necessary control components including a 60

AMP main disconnect, 120 volt fused control circuit transformer, dual element fuses, numbered terminal block, high water, low water and low water cut-off lights, power on light, Pump run light for each pump, Pump Failure Alarm, alarm horn, alarm silence relay with push button and other required controls. Boiler feed pumps switches to be provided with 3 position switches Hand/Off/Auto. The enclosure shall be a dead front design and require only one 3-phase power supply. Provide combination starters for each pump motor with individual disconnect switches. Motor starters should be fused and wired to common main panel disconnect switch.

- k. PID single loop controllers shall be provided for modulating function of the system. Functions that will be controlled are level and temperature.
  - l. All of the above shall be factory pre-wired and tested in accordance with the provisions of the National Electric Code.
    - 1) BLOWDOWN SEPARATOR
- B. Furnish A.S.M.E stamped centrifugal blowdown separator.
  - C. The separator shall be designed for a boiler operating at 10 PSIG, with a design pressure of 50 PSIG, a 150# flanged 2" inlet, a 150# flanged 5" vent, and a 150# flanged 4" drain. With required floor supports.
  - D. Furnish one 4" flanged aftercooler with 1 1/4" bulb-sensing temperature control valve, check valve and discharge temperature gauge.
  - E. Wilson Engineering or approved equal.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION OF EQUIPMENT**

- A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases.
  - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
  - 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.
  - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- B. Install unit to permit access for maintenance.
- C. Support piping independent of pumps.
- D. Install base-mounted pumps on concrete bases with grouted base frames.
- E. Install parts and accessories shipped loose.

#### **3.02 CONNECTIONS**

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Connect makeup water piping to an existing line with reduced-pressure backflow preventers.
- D. Install overflow drain piping to nearest floor drain.
- E. Install vents and extend to outdoors; terminate with elbow turned down and an insect screen (or tie into existing vent penetrations – see drawings).

#### **3.03 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

- B. Perform tests and inspections and prepare test reports.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
  - 1. Inspect field-assembled components, equipment installation, and piping and electrical connections for compliance with manufacturer's written instructions.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 3. Check bearing lubrication.
  - 4. Verify proper motor rotation.
  - 5. Start up service.
  - 6. Report results in writing.
- D. Remove and replace malfunctioning units and retest as specified above.

### **3.04 ADJUSTING**

- A. Adjust boiler water-level controls to properly stage unit.
- B. Set field-adjustable, makeup water and cooling-water controls.

### **3.05 CLEANING**

- A. Clean equipment internally; remove coatings applied for protection during shipping and storage, foreign material, and oily residue according to manufacturer's written instructions.
- B. Clean strainers.

### **3.06 SYSTEM VERIFICATION TESTING**

- A. System verification testing is part of the Commissioning Process. Verification testing shall be performed by the contractor and witnessed and documented by the Commissioning Agent. Refer to Section 019113, Project Commissioning Requirements, for detailed commissioning requirements.

### **3.07 DEMONSTRATION**

- A. Train Owner's maintenance personnel to adjust, operate, and maintain feedwater units. Refer to Division 01 Section "Demonstration and Training."

**END OF SECTION 23 53 13**