

SECTION 23 51 00
BREECHINGS, CHIMNEYS, AND STACKS

PART 1 - GENERAL:

1.1 DESCRIPTION:

This section specifies turbine and HRSG gas exhaust system and all accessories from the turbine and boiler outlet to the stack outlet to the atmosphere. Flue gas recirculation (FGR) ductwork required for burners furnished is also specified. Diverter valve for main and bypass vent stack is also specified.

1.2 RELATED WORK:

- A. Section 07 60 00, FLASHING and SHEET METAL: Roof Penetrations.
- B. Section 23 05 11, COMMON WORK RESULTS FOR HVAC and STEAM GENERATION.
- C. Section 23 05 51, NOISE and VIBRATION CONTROL FOR BOILER PLANT.
- D. Section 23 07 11, HVAC, PLUMBING, and BOILER PLANT INSULATION.
- E. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS. Requirements for commissioning, systems readiness checklists, and training
- F. Section 23 52 33.20, HEAT RECOVERY STEAM GENERATOR (HRSG).
- G. Section 23 09 11, INSTRUMENTATION and CONTROL FOR BOILER PLANT: Boiler Draft Control System.

1.3 QUALITY ASSURANCE:

- A. Provide scale drawings showing nominal dimensions and weight of the systems.
- B. Turbine, boiler and burner manufacturer shall review complete system from turbine and boiler flue gas outlet to stack outlet to atmosphere and advise the Government of any changes required to meet boiler and burner performance requirements. Note the altitude of plant site.
- C. If a double wall, factory-fabricated, positive pressure breeching and stack system is provided, the manufacturer shall completely engineer the entire system and provide all components. Manufacturer's representative shall provide installation instructions prior to start of construction, train the installers and certify in writing to the PM/COTR that the entire installation complies with the official standards of the manufacturer and with the project specifications.
- D. Conform to NFPA 54 and NFPA 31 for installation of fuel burning equipment and appliances.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

- B. Design, materials, weights, construction, pressure and temperature limitations of breeching and stack systems, flue gas recirculation system.
- C. Drawings showing all components, system arrangement and dimensions.
- D. Design, construction, allowable movements, movement forces, pressure and temperature limitations of expansion joints.
- E. Diverter valve design, construction, pressure and temperature limitations, pressure loss at design flow, and leakage of closed damper.
- F. Support designs, locations and loads for entire assembly
- G. Written statement from turbine/boiler/burner manufacturer that the design of the system is satisfactory to achieve the required boiler/burner performance.

1.5 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Institute of Steel Construction (AISC):
Steel Construction Manual, Thirteenth Edition
- C. ASTM International (ASTM):
 - A36/A36M-08.....Standard Specification for Carbon Structural Steel
 - A242/A242M-04(2009).....Standard Specification for High-Strength Low-Alloy Structural Steel
 - A307-07b.....Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
 - A563-07a.....Standard Specification for Carbon and Alloy Steel Nuts
 - A568/A568M-09a.....Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements For
- D. American Welding Society (AWS):
D1.1/D1.1M-2010.....Structural Welding Code-Steel
- E. Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS):
SP-58-2009.....Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation
- F. National Fire Protection Association:
NFPA 54-2006.....National Fuel Gas Code

NFPA 31-2006.....Standard for the Installation of Oil-Burning
Equipment

PART 2 - PRODUCTS:

2.1 BREECHING, STACKS, FGR DUCTWORK:

- A. Refer to drawings for arrangement and dimensions. Connections to boilers and economizers must comply with the written recommendations of the boiler and economizer manufacturers. Ninety-degree tee sections are not permitted. Intersections must be made with lateral tees.
- B. Service: Design for continuous 950 °F, 12 kPa (50 inches WC) positive and negative internal pressure, and wind-loading for outside stacks.
- C. Pre-engineered, Pre-Fabricated, Double-Wall System:
 1. Complete factory-built system, all components and installation engineered and provided by manufacturer of system.
 2. Corrosion-resistant steel, double-wall, circular cross section, positive pressure, blanket insulation between walls. For stack sections outside the building, air space with no insulation between walls is allowed.
 3. Factory-built standard sections, connected in the field with joining system designed and provided by system manufacturer. Designed to be pressure and vacuum-tight, no deformation, at the service conditions specified.
 4. System manufacturer's engineered support system, attached to structural members of the building, with expansion joints between rigid supports. Thermal expansion shall be handled by expansion joints and variable spring hangers. Thermal expansion and weight of system shall not impose loads in excess of that allowed by manufacturer of boiler, economizer, or any other equipment, or exceed capabilities of building structure. Spring hangers shall conform to MSS SP-58, Type 51, variable spring.
 5. UL-listed for 150 mm (6 inches) clearance to combustible materials and 100 mm (4 inches) clearance to non-combustible materials.
 6. Inner Wall: Stainless steel, Type 304, 0.9 mm (0.035-inch) minimum thickness for diameters 900 mm (36 inches) and smaller and 1.2 mm (0.048 inches) minimum thickness for diameters greater than 900 mm (36 inches) and 1200 mm (48 inches) and less.
 7. Outer Wall: Aluminized or galvanized steel except 304 stainless steel outside of building, 0.6 mm (0.025 inch) minimum thickness for inner wall diameter 800 mm (32 inches) and less, 0.9 mm (0.034 inch) minimum thickness for inner wall diameter over 800 mm (32 inches) and 1200 mm (48 inches) and less.

8. Uninsulated Air Space between Inner and Outer Walls (Outside the Building Only): 25 mm (one inch) minimum.
9. Insulation Between Walls: Fiberglass or mineral wool, 315 °C (600 °F). Minimum thickness 50 mm (2 inches).
10. Bands for Joining Sections: Same material as section being joined. Utilize sealant provided by system manufacturer.
11. Roof and wall penetrations shall be manufacturer's standard ventilated thimble. Conform to Section 07 60 00, FLASHING and SHEET METAL.
12. Stack Outlet: Provide double cone rain cap or other type termination designed by manufacturer of the stack system.
13. Drain Section: Provide inside building below roof to drain rain water from stack. Extend drain pipe to floor drain. Termination shall not impact turbine and HRSG performance.
14. Guys: Provide stack guy wires above roof, with spring-loaded tensioners, in accordance with printed instructions of stack manufacturer.
15. Carbon steel vent stack from HRSG through roof is acceptable. Insulation is required inside the building.
16. Cor-ten steel vent stack from diverter through roof is acceptable. Insulation is required inside the building.

2.2 DIVERTER

- A. A diverter designed for full turbine exhaust flow shall be provided and capable of closing against 1.5 times the turbine exhaust pressure. Temperature rating shall be appropriate for the maximum turbine exhaust temperature.
- B. Diverter Actuator: Electric type that shall operate damper without overload. Provide 100 percent duty cycle maintenance-free motors that never overheat or burnout under stalled conditions. Constant speed coordinated with the controlled process so that performance parameters remain within requirements. For systems without draft control, the drive unit shall automatically open damper 90 degrees on HRSG purge and firing cycle; close diverter valve on HRSG shut down.

2.3 EXPANSION JOINTS

- A. Provide sufficient types, quantities, and locations of expansion joints to completely absorb all thermal expansion of the system without imposing excessive loads on equipment or building structure.

2.4 ACCESSORIES

- A. Drains: Provide threaded pipe connection to allow drainage at all low points and drain connections in stack and breeching systems. Slope piping system to the drain. Pipe size shall be 25 mm (1 inch) minimum.
- B. Instrument Ports: Locate on individual stack or breeching serving each boiler. Locate in non-turbulent zone within 3600 mm (12 feet) of boiler room floor between boiler and economizer (when economizer is provided) or locate accessible from platform. Provide separate ports for the following:
 - 1. Flue gas oxygen analyzer: Coordinate with analyzer furnished.
 - 2. Opacity monitor (if required): Coordinate with sensor furnished. Locate downstream from oxygen analyzer.
 - 3. Stack temperature sensor: Coordinate with sensor furnished.
 - 4. Draft gauge: 25 mm (1 inch) diameter coupling, plugged.
 - 5. Test instruments: 25 mm (1 inch) diameter coupling, plugged.
- C. Access Doors: Bolted, gasketed, insulated, with handles. Provide where shown. Minimum opening 400 mm x 400 mm (16 inches x 16 inches).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Supports: Completely support all systems from the building structure without overloading the building structure or the connected equipment. Support system shall be engineered by the system manufacturer and shall accommodate thermal expansion.
- B. Factory-Fabricated Stack or Breeching System:
 - 1. Install in accordance with manufacturer's printed instructions, NFPA 54 and NFPA 31.
 - 2. Deliver a copy of the instructions to the PM/COTR prior to commencing the installation.
 - 3. Representative of manufacturer shall provide field training on all installation techniques to all installers.
- C. Connect 25 mm (1 inch) minimum pipes with ball valves to breeching and stack drains. Extend to floor drain.

3.2 COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.
- B. Components provided under this section of the specification will be tested as part of a larger system. Refer to Section 23 08 00 -

COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

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