

**DIVISION 23**  
**SECTION 23 51 23**  
**GAS VENTS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This Section includes the requirements for provision of listed double-wall, prefabricated flue gas breeching systems and double-wall prefabricated combustion air intake breeching systems serving the gas-fired domestic hot water heaters in each of the fifteen (13) buildings of the Site. This Section also includes the requirements for provision of the automatic flue gas draft regulating dampers and controllers, for installation in the domestic hot water heater flue gas breeching systems, where shown on the Contract Drawings. The Contract Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Specifications, apply to this Section.
1. This section **does NOT include** the requirements for provision of the listed, double-wall, prefabricated, insulated breeching system serving the gas-fired central low-pressure steam boiler plant. Refer to the specified requirements of Section 23 51 16, "Prefabricated Breechings and Accessories", for the requirements for provision of the listed, double-wall, prefabricated, insulated breeching system serving the gas-fired central low-pressure steam boiler plant.
  2. This section **does NOT include** the requirements for provision of the chimney liner system serving the gas-fired central low-pressure steam boiler plant. Refer to the specified requirements of Section 23 51 00, "Chimney Liner", for the requirements for provision of the chimney liner system serving the gas-fired central low-pressure steam boiler plant.
- B. Related Sections:
1. Section 01 51 23 - Temporary Heating
  2. Section 23 05 00 – Common Work Results For HVAC
  3. Section 23 05 13 - Common Motor Requirements For HVAC Equipment
  4. Section 23 05 23 - General Duty Valves For HVAC Piping
  5. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
  6. Section 23 05 53 - Identification for HVAC Piping and Equipment
  7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
  8. Section 23 07 00 - HVAC Insulation
  9. Section 23 09 13 - Instrumentation and Control for HVAC
  10. Section 23 09 14 - Natural Gas and CO Gas Leak Detection Equipment
  11. Section 23 09 23 - Control Dampers
  12. Section 23 09 24 - Steam Flow Meters
  13. Section 23 22 13 - Steam and Condensate Heating Piping
  14. Section 23 25 19 - Water Treatment for Steam System Feedwater
  15. Section 23 31 13 - Metal Ducts
  16. Section 23 33 00 - Air Duct Accessories

17. Section 23 34 16 - Boiler Room Combustion Air Makeup And Ventilation System
18. Section 23 51 00 - Chimney Liner
19. Section 23 51 16 - Prefabricated Breechings and Accessories
20. Section 23 51 23 - Gas Vents
21. Section 23 52 39 - Firetube Boilers
22. Section 23 53 12 - Vacuum Condensate Pumps
23. Section 23 53 13 - Boiler Feedwater Pumps

## 1.02 SUBMITTALS

### A. Shop Drawings

1. Submit shop drawings showing fabrication and installation details for the domestic water heaters' double-wall prefabricated flue gas breeching systems and double-wall prefabricated combustion air intake breeching systems. Include plans, elevations, sections, details, and attachments. Detail assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, hangers, and location and size of each field connection. Shop drawings shall indicate:
  - a. Layout plans, elevations, sections and details of the domestic water heaters' double-wall prefabricated flue gas breeching systems and double-wall prefabricated combustion air intake breeching systems, including details of all hangers, suspension support systems and supplemental galvanized steel support members.
  - b. The shop drawing submittal shall coordinate the flue gas breechings system with the structural supports to be provided for the vertical breeching risers outdoors along the façade of the building, as specified and shown under the Structural Division of the Work.
  - c. The shop drawing submittal shall coordinate the flue gas breeching system and the combustion air intake breeching system with the Water Heater Rooms' structural and architectural features, utility piping, electrical conduits, lights, and all other items and accessories.
  - d. The shop drawings shall coordinate the flue gas breeching and combustion air intake breeching systems' foundation wall penetrations with their required provisions of wall sleeves and weather-tight UL approved sealant systems at those penetrations.
  - e. The shop drawings shall coordinate the flue gas breeching system with the required provision of base-Tee-cleanout and rain-and-condensate drain piping connection, as shown and specified under the Contract Documents. Coordinate the provision of electrical heat tracing for outdoor-installed segments of drain piping with the Electrical Division 26.

B. Certified Sizing Calculations: Manufacturer shall certify flue gas breeching system and combustion air intake breeching system sizing calculations.

C. Quality Control Submittals

1. Certificates: Submit certificates of materials compliance with specified ASTM, UL, and ASHRAE requirements.
- D. New York City Building Department: Submit copy of all approved plan and permits.
- E. Submit manufacturer's ten (10) year warranty for the domestic water heaters' double-wall prefabricated flue gas breeching systems and double-wall prefabricated combustion air intake breeching systems. Warranty start period shall be defined as the Date of Substantial Completion and the successful completion of the installations' required smoke testing of the flue gas breeching systems and acceptance by NYCHA. In order to obtain a ten (10) year warranty, the final layout of shop drawings for the prefabricated double-wall metal breeching systems shall be delivered and approved by the manufacturing company, and the installations shall each be field inspected and certified to be in compliance with the factory requirements by a factory authorized representative of the manufacturing company.
- F. Certification: Manufacturer's affidavit for gas-fired condensing type domestic water heaters double-wall prefabricated metal breeching systems, certifying that the double-wall breeching systems have been installed properly and in accordance with the manufacturer's published installation instructions.

### **1.03 QUALITY ASSURANCE**

A. Codes and Standards

1. NFPA: Comply with NFPA 211-2010: Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances.
2. UL: Comply with applicable portions of UL safety standards; provide products that have been UL listed and labeled.
3. ASHRAE: Comply with the ASHRAE Equipment Handbook, for Chimney, Gas Vent, and Fireplace Systems, material requirements and design criteria.
4. Comply with the City of New York Construction Codes and the State of New York Building Code and any other public authorities having jurisdiction.
5. For prefabricated double-wall flue gas breechings and combustion air intake breechings, all system components shall be the source of only a single manufacturing company.
6. Testing of material shall be in accordance with Section §28-113 of the NYC Administrative Code (reference Section MC 301.5 of the 2014 NYC Mechanical Code). Whenever the NYC Construction Codes or the Rules of the Department of Buildings requires that material be listed or labeled and material proposed to be used is not so listed or labeled, the use of such material shall be subject to prior approval by the Commissioner (Office of Technical Certification and Research OTCR) and such material shall be used only to the extent set forth in such approval. Materials that were previously approved by the Board of Standards and Appeal (BSA) or by the Department (MEA) before the effective date of the NYC Construction Codes may continue to be used, but only to the extent set forth in

such approval, and only if such approval is not specifically amended or repealed by the Commissioner.

7. The installation, alteration, maintenance, design, minimum safety requirements, repair and approval of factory prefabricated breeching systems shall be in accordance with Chapter 5 of the NYC Fuel Gas Code, Chapter 8 of the NYC Mechanical Code and Chapter 21 of the NYC Building Code.

#### **1.04 WARRANTY**

- A. All warrantees shall use the date of Substantial Completion as the start date. Boilers double-wall prefabricated insulated metal breeching systems shall be warranted by the manufacturer for a period of at least ten (10) years from date of Substantial Completion of installation and successful completion of the installations' smoke testing and acceptance by NYCHA. In order to obtain a ten (10) year warranty, the final layout shop drawings for the prefabricated double-wall prefabricated metal breeching systems shall be reviewed and approved by the manufacturing company, and each installation shall be field inspected and certified to be in compliance with the factory requirements by an authorized representative of the manufacturing company.

### **PART 2 - PRODUCTS**

#### **2.01 DOUBLE-WALL PREFABRICATED FLUE GAS BREECHING SYSTEMS FOR CONDENSING TYPE NATURAL GAS-FIRED DOMESTIC WATER HEATERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following, or approved equal:
  1. Heat-Fab Model CI Plus
  2. Simpson Dura-Vent FasNSeal W2
  3. Van Packer Model CS or approved equal
  4. Security Chimneys Model SSD-THSCA
  5. Or approved equal
- B. Prefabricated double-wall metal breeching and chimney systems shall comply with NFPA 211-2010 and NFPA 54-2006, suitable for use with condensing type natural gas-fired domestic hot water heaters.
- C. Prefabricated double wall metal breeching and chimney systems shall be listed in accordance with UL 1738-06, "Venting Systems for Gas-Fired Appliances, Categories II, III and IV" for up to 550°F for use with low heat appliances burning natural gas.
- D. The breeching and chimney systems shall withstand without rupture an internal air pressure of 2-½ times the manufacturer's rated positive pressure. The system, when sealed properly, shall maintain airtight integrity at pressures up to 5-inches of water column at room temperature.
- E. Provide breeching and chimney systems of inner diameter dimensions as indicated on the Contract Drawings, minimum. The double-wall metal breechings and chimneys shall be fabricated with AL-29-4C or VP1738 stainless steel inner wall and Type 304 or Type 430 or Type 441 stainless steel outer wall. The outer wall surface finish shall be coordinated to be compatible with any painting or coatings as specified in the

Architectural sections of the specifications. Between the inner and outer shells there shall be a minimum of at least ½-inch concentric annular air space. The inner pipe and outer jacket shall be joined at the factory and shipped as a factory-assembled unit. Breeching systems that have the outer jacket wall attached during the field installation will not be approved. The gages of the inner liner and outer wall shall be as follows:

<b>Inner Chimney Diameter</b>	<b>Minimum Wall Thickness Inner Liner</b>	<b>Minimum Wall Thickness Outer Wall</b>
4 to 6-inches	0.015-inch	0.016-inch
7 to 8-inches	0.015-inch	0.024-inch
9 to 12-inches	0.019-inch	0.024-inch
14 to 16-inches	0.020-inch	0.024-inch
18 to 24-inches	0.024-inch	0.024-inch
26 to 32-inches	0.035-inch	0.030-inch

- F. The condensing type domestic hot water heaters' double-wall breeching and chimney systems, from the heaters outlets to the termination above the roof shall be designed to eliminate on-site welding through the use of internal gaskets and connecting tabs/locking bands. Field sealing of any inner joints is not permissible.
- G. The chimney may be terminated with a prefabricated rain-cap if the breeching and chimney system is a listed factory built chimney meeting the requirements of NYC FGC 503.5.4. Where a rain cap is not provided a velocity cone termination fitting shall be provided.
- H. The prefabricated double-wall metal breeching and chimney systems' manufacturing company shall provide all tees, elbows, increasers, hood connectors, termination, adjustable roof flashings, storm collars, support assemblies, thimbles, flexible connectors, firestop spacers, and fasteners; fabricated from similar materials and designs as pipe straight sections; all listed for same assembly. Included unique components are required to comply with NFPA 54. Install horizontal segments of flue gas breechings with a continuous upward pitch towards their chimney terminations of at least ¼-inch-per-linear foot, minimum.
- I. For installation of condensing boilers in the Boiler Room of Building No. 7, where the chimney penetrates the low roof over the Boiler Room, provide tall-cone flashing, sealing and through-the-roof assembly.
- J. Provide a prefabricated Tee fitting with removable cleanout cap at the base of each chimney riser, with 1-inch minimum diameter rain and condensate drain pipe connection with P-trap, and connection to a JM Corp., or approved equal in-line replaceable acid neutralization filter, run to spill over local floor drain. Drain piping segments installed outdoors are to be provided with electrical heat tracing for freeze-protection as specified and shown under the under the Electrical Division 26, and shall be thermally insulated as specified under Section 23 07 00.
- K. Provide a pipe sleeve for each breeching penetration through the exterior façade wall of each Mechanical Room, located as shown on the Contract Drawings and installed at elevation tight to the underside of the existing structural framing along the exterior façade. Provide weather-proof UL approved silicone sealant and insulation of the annular air space at each sleeved penetration of the exterior façade.

- L. Install vertical breeching/chimney risers in precise locations as indicated on the Contract Drawings that have been strategically determined to be at the midpoint between the adjoining windows of the façade.
- M. This Section shall coordinate with the Structural Division for the provision of supports for the vertical chimney risers, to be provided as specified and shown under the Structural Contract Documents.

## **2.02 DOUBLE-WALL PREFABRICATED COMBUSTION AIR INTAKE BREECHING SYSTEMS FOR CONDENSING TYPE NATURAL GAS-FIRED DOMESTIC WATER HEATERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following, or approved equal:
  - 1. Heat-Fab Model CI Plus
  - 2. Simpson Dura-Vent FasNSeal W2
  - 3. Van Packer Model CS or approved equal
  - 4. Security Chimneys Model SSD-THSCA
  - 5. Or approved equal
- B. Prefabricated double-wall metal breechings shall comply with NFPA 211-2010 and NFPA 54-2006, suitable for use with condensing type natural gas-fired domestic hot water heaters.
- C. Prefabricated double wall metal breechings shall be listed in accordance with UL 1738-06, "Venting Systems for Gas-Fired Appliances, Categories II, III and IV" for up to 550°F for use with low heat appliances burning natural gas.
- D. The breeching systems shall withstand without rupture an internal air pressure of 2-½ times the manufacturer's rated positive pressure. The system, when sealed properly, shall maintain airtight integrity at pressures up to ±5-inches of water column at room temperature.
- E. Provide breeching systems of inner diameter dimensions as indicated on the Contract Drawings, minimum. The double-wall metal breechings shall be fabricated with Type 304 or Type 430 or Type 441 stainless steel for both the inner and outer walls to eliminate the requirement for future painting or maintenance. Between the inner and outer shells there shall be a minimum of at least ½-inch concentric annular air space. The inner pipe and outer jacket shall be joined at the factory and shipped as a factory-assembled unit. Breeching systems that have the outer jacket wall attached during the field installation will not be approved. The gages of the inner liner and outer wall shall be as follows:

Inner Chimney Diameter	Minimum Wall Thickness Inner Liner	Minimum Wall Thickness Outer Wall
4 to 6-inches	0.015-inch	0.016-inch
7 to 8-inches	0.015-inch	0.024-inch
9 to 12-inches	0.019-inch	0.024-inch
14 to 16-inches	0.020-inch	0.024-inch
18 to 24-inches	0.024-inch	0.024-inch
26 to 32-inches	0.035-inch	0.030-inch

- F. The condensing type domestic hot water heaters' double-wall combustion air intake breeching systems, from the outdoor air intake termination to the heaters' inlets, shall be designed to eliminate on-site welding through the use of internal gaskets and connecting tabs/locking bands. Field sealing of any inner joints is not permissible.
- G. The horizontal outdoor air intake opening termination end shall be canted at 45-degrees to prevent the ingress of snow and rain, and shall be provided with a ½-inch stainless steel wire mesh screen.
- H. The prefabricated double-wall metal combustion air intake breeching systems' manufacturing company shall provide all tees, elbows, increasers, hood connectors, termination, collars, support assemblies, thimbles, flexible connectors, firestop spacers, and fasteners; fabricated from similar materials and designs as pipe straight sections; all prefabricated for the same assembly.
- I. Provide a pipe sleeve for each combustion air intake breeching penetration through the exterior façade wall of each Mechanical Room, located as shown on the Contract Drawings and installed at elevation tight to the underside of the existing structural framing along the exterior façade. Provide weather-proof UL approved silicone sealant and insulation of the annular air space at each sleeved penetration of the exterior façade.
- J. Install combustion air intake breeching exterior façade wall penetrations in precise plan locations as indicated on the Contract Drawings.

**2.03 DRAFT PRESSURE REGULATING DAMPERS AND CONTROLLERS FOR DOMESTIC HOT WATER HEATER FLUE GAS BREECHING SYSTEMS**

- A. Where indicated on the Contract Drawings, provide a flue gas breeching mounted draft pressure regulating damper and associated local control panel, as specified herein and as shown on the Contract Drawings. Flue gas draft pressure regulating dampers and control systems to maintain a constant negative or positive pressure in the flue gas breeching system, shall be a model SB single-blade butterfly damper with Viton blade seal and 1/2-inch graphite sealed bearings, modulating damper operator, and a model CDS2 electrical/electronic controller, UL 378 Listed, Model "G", rated for operation at up to 550°F, as manufactured by US Draft Co., or approved equal. System shall include provision of a capacitor return safety mechanism. The damper shall automatically modulate to restrict the flow of flue gas in breechings in instances where excessive negative draft pressure exists. The damper shall be leakage rated for a maximum of 10 CFH flue gas flow at 3-inches WG differential static pressure. Unit shall be factory provided with a two-year mechanical warranty.

- B. The damper shall be constructed of type 316 stainless steel blade and housing. The modulating motor actuator shall be designed for maximum 4-second operation. The damper and controller shall be provided with an integral 24 Volts DC control power transformer and shall be equipped for operation with a zero-to 10 Volts DC electrical control signal, and provided with 120 Volts AC electrical power supply.
- C. The unit shall be factory provided with a model LP5 bi-directional pressure transducer, with two 1/4-inch barbed pressure ports for high temperature rated silicone tubing connections, to provide pressure feedback to the model CDS2 controller. Pressure range shall be factory set to within  $\pm 1.00$ -inch WG  $\pm 1\%$  FSO accuracy with  $< \pm 1.0\%$  FSO per year stability.
- D. The unit shall be factory provided with a model GFS gas flow switch, to verify the operation of the model CDS2 damper. The switch shall provide an SPDT relay rated to 5.0 amps at 120 Volts AC. The switch setpoint shall be adjustable from 0.08-inch WG to 1.8-inches WG.
- E. Coordinate with the Electrical Div. 26 for provision of 120 Volt single-phase 60Hz electrical power to the unit controller, from the nearest available local power panel's spare 120 Volt circuit breaker.
- F. The unit shall be installed in strict accordance with the manufacturer's published instructions, and as shown on the Contract Drawings.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Double-wall prefabricated insulated metal flue gas breeching and chimney systems and combustion air intake breeching systems for natural gas-fired domestic hot water heaters:
  - 1. Install in accordance with manufacturer's published installation instructions and UL listing. Maintain minimum clearances of flue gas breechings from combustibles specified in UL listing.
  - 2. Seal joints between sections of positive pressure breechings and chimneys in strict accordance with manufacturer's published installation instructions, and using only sealants recommended by manufacturer.
  - 3. Support breechings and chimneys at intervals recommended by the manufacturer to support the weight of the chimney and all accessories, without exceeding loading of appliances. Coordinate the supports for the vertical flue gas chimneys mounted exposed outdoors along the exterior façade of the building, with the Structural Division of the Work.



4. Pitch flue gas breechings continuously upward in the direction of gas flow (towards the vertical chimney) at a minimum slope of at least ¼-inch per linear-foot.
5. Provide prefabricated expansion joints in the breeching system where shown on the Contract Drawings.
6. Per Section NYC FGC 503.5.4.4 4, a termination caps shall not be permitted on non-listed chimneys. A positive means shall be provided to prevent water from entering the appliance as shown on the Drawings. Termination caps shall be permitted on listed factory-built chimneys.
7. Per NYC DEP Rules Effective February 17, 2014 Article 2-11 Installation Design, chimneys shall not be fitted with rain caps or covers of any kind. However, factory-made chimneys shall be installed per the manufacturer's specifications.
8. Install chimney drain with P-trap to remove rainwater and condensation per Sections NYC FGC 501.16 and FGC 503.5.4.4.4, Section MC 801.21 and Section PC 1002 of the 2014 NYC Plumbing Code. For outdoor-installed drain piping segments, coordinate the provision of electric heat tracing with the Electrical division 26, and provide thermal insulation, as specified under Section 23 07 00.
9. Perform smoke testing of each flue gas breeching and chimney system as required by the NYC DOB / DEP, as specified under Section 23 05 93, and submit Smoke Test Report and Results. Any deficiencies and/or defects evident as results of the testing shall be repaired, and the smoke test shall be subsequently repeated as may be necessary, until demonstrating and documenting successful completion of the smoke test.

### **3.02 FIELD QUALITY CONTROL:**

- A. The Contractor shall enlist the services of the manufacturer's authorized representative to oversee the installation of all systems joints assemblies. Upon completion of the installation, the manufacturer's authorized representative shall sign a written affidavit, attesting that the systems installation was performed in strict accordance with the manufacturer's published instructions.

**END OF SECTION**

SAMPLE

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