DIVISION 23 – MECHANICAL

SECTION 235750 – BREECHING, CHIMNEYS AND STACKS

PART 1 - GENERAL

1.01 GENERAL

A. The General Provision of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.02 RELATED WORK

A. Section 232800-Insulation
B. Section 23xxxx-Boiler, Burner and Controls

1.03 REFERENCES

A. The following references apply to the extent noted here-in:

1. ASTM A525 - Zinc Coating
2. ASTM A527 - Galvanized Sheet Steel
3. ASTM A569 - Carbon Steel
4. NFPA 37 – Combustion Engines and Gas Turbines
5. NFPA 54 – National Fuel Gas Code
6. NFPA 211 – Standards for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances.
7. UL 103 – Standard for Factory Built Chimneys (US)
   ULC-ORD-C959 & ULC-S604 Standard for Factory Built Chimneys (CDA)
8. UL-1978 – Standard for Safety Grease Ducts (US & CDA)
9. UL 441 – Gas Vents (US)
   ULC S-605 – Gas Vents (CDA)
10. UL1738 – Standard for Safety Venting Systems for Gas Burning Appliances (US)
    ULC S-636 Standard for Safety Venting Systems for Gas Burning Appliances (CDA)
11. SMACNA - Duct Construction Standards
12. UL 1777 – Chimney Liners (US)
    ULC S-640 and ULC S-635 – Chimney Liners (CDA)

1.04 INSTALLATION

A. The entire installation shall comply with National Safety Standards and all building codes when installed.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. The system shall be as supplied by Security Chimneys International Ltd or equal, as follows:

1. Insulated Double Wall Positive Pressure Chimney System (CIX)
2. Type B Double Wall Gas Vent (CG)
3. Condensing Heating Appliances Vent System (AL29-4C® stainless steel Venting Secure Seal SS or SSD)
4. Chimney Liners (CT)
5. On-Site Fabrication

2.02 DOUBLE WALL INSULATED POSITIVE PRESSURE CHIMNEY (CIX/CAX)

A. The Insulated Breeching System components, supports and terminations shall be the product of one manufacturer shall be fully factory fabricated and shall be laboratory tested and listed by Intertek Testing Services (ETL) for use with building heating equipment, burning gas or liquid fuels, as described in NFPA 211, Chapter 2.

B. The Breeching System shall be Intertek Testing Services (ETL) tested and listed as a breeching and chimney system suitable for 60 inch W.C. positive pressure, based upon compliance with the construction requirements and ¨Positive Pressure Applications Test¨ protocol described in Paragraph 9, 7 and Section 22 A respectively, of the Standard for Factory Built Breeching, ANSI/UL103. Compliance with such standards/specification shall be confirmed by a statement on the safety certification label attached to the product, indicating ¨Suitable for positive pressure venting applications with maximum 60 inch water column internal static pressure at 1000 degrees F continuous, 1400 degrees F intermittent.

C. The complete Breeching System shall be fabricated as follows:

1. Inner wall – 0.035 inch type 304 or 316 stainless steel for all diameters.
   a. Use 304 stainless for gas and #2-fuel oil.
   b. Use 316 stainless for all other fuels.

2. Outer wall
   a. 5 inch through 24 inch diameter 0.018 inch galvalum (Alu-Zinc) steel.
   b. 26 inch through 36 inch diameter 0.024 inch galvalum (Alu-Zinc) steel.
   c. Alt. Material – 304 or 316 stainless steel.

3. Insulation CIX– 2 inch 8 PCF mineral wool between inner and outer wall
   Insulation CAX – Air insulated

4. From outer diameter one inch minimum air gap to combustibles for sizes 5 inch to 36 inches.

D. The complete Breeching System, from appliance outlet to chimney, shall be designed to eliminate on-site welding through the use of a flanged male and female self-centering coupling configuration and by incorporating a wide type "V" locking band. The fastening of all locking bands shall be accomplished through the use of captive nuts and bolts to provide ease of locking. The chimney joints shall be field sealed using SCIL, model S-650 silicone sealant or equal. The system, when sealed, shall maintain airtight integrity at pressures up to 60 inch of water column at room temperature.

E. The inner pipe and outer jacket shall be joined at the factory and shipped as a factory assembled unit to ensure ease of installation and product uniformity. A system where the outer jacket is attached during field installation is not acceptable.

F. Thermal expansion shall be compensated for through the use of manufacturer supplied insulated expansion joints.

G. The Breeching shall be guaranteed by the manufacturer to be free from defects due to faulty material or workmanship for a period of 15 years minimum. Terms and conditions for the guarantee shall be as stated in the manufacturer's standard guarantee which must be included with submittal drawings

H. Detailed manufacturer's submittal drawings shall be provided for approval prior to manufacture or installation of the Breeching System.

I. The manufacturer's representative organization shall provide on-site instructions and technical support services, as required, prior to and during installation of the Breeching System. A sign-off is required. Upon completion of the installation, the manufacturer's representative organization shall certify, in writing, to the Engineer that the Breeching System has been installed property and in accordance with the manufacturer's installation instructions.

2.05 TYPE B DOUBLE WALL GAS VENT (CG)

A. The type B system components, supports and terminations shall be the product of one manufacturer, shall be fully factory fabricated, shall be laboratory tested and listed by the Underwriters Laboratory, Inc. for use with building heating equipment, burning gas as described in NFPA 54 and NFPA 211.

B. The Breeching System shall be Underwriters Laboratories, Inc. tested and listed as a venting system suitable for use with approved Category 1 appliances burning natural gas or LP gas which produce flue gases exhausted at temperature not exceeding 525°F, based upon compliance with the construction requirements and the UL-441 / ULC S-605 Standard.

C. The complete breeching system shall be fabricated as follows:

1. Inner Wall Material
   Sizes 3 inch to 12 inches diameter 0.016'' Aluminium alloy
   Sizes 14 inches to 24 inches diameter 0.025'' Aluminium alloy
   Sizes 26 inches to 36 inches diameter 0.032'' Aluminium alloy

2. Outer Wall Material
   Sizes 3 inch to 12 inches diameter: 0.018'' galvalum (Alu-Zinc) steel
   Sizes 14 inches to 24 inches diameter: 0.021''galvalum (Alu-Zinc) steel
   Sizes 26 inches to 36 inches diameter: 0.021'' galvalum (Alu-Zinc) steel

3. 1/4 inch air space between walls for 3 inch to 7 inch diameter
   1/2 inch air space between walls for 8 inch to 36 inch diameter

4. From outer diameter one inch minimum air gap to combustibles for sizes 3 inch to 36 inches.

D. The complete Breeching System, from appliance outlet to chimney, shall be designed to eliminate on-site welding through the use of a twist-lock connection system for diameters 3 inch to 12 inch or a simple slip-fit connection secured with self-taping screws for diameters 14 inch to 36 inch.

E. The Breeching shall be guaranteed by the manufacturer to be free from defects due to faulty material or workmanship for a period of 5 years. Terms and conditions for the guarantee shall be as stated in the manufacturer's standard guarantee which must be included with submittal drawings.

F. Detailed manufacturer's submittal drawings shall be provided for approval prior to manufacture or installation of the Breeching System.

G. The manufacturer's representative organization shall provide on-site instructions and technical support services, as required, prior to and during installation of the Breeching System. A sign-off sheet is required. Upon completion of the installation, the manufacturer's representative organization shall certify, in writing, to the Engineer that the Breeching System has been installed properly and in accordance with the manufacturer's installation instructions.

2.06 CONDENSING HEATING APPLIANCES (AL29-4C® STAINLESS STEEL VENTING) SECURE SEAL SS OR SSD

A. SCIL Secure Seal shall be manufactured from AL29-4C stainless steel or equivalent, a super ferritic stainless steel specifically designed for extreme resistance to chlorine ion pitting, crevice corrosion, and stress corrosion induced by the generation of corrosive condensates by partially or fully condensing natural gas or propane fired heating appliances.

B. The system components, supports and terminations shall be the product of one manufacturer, shall be fully factory fabricated, shall be laboratory tested and listed by Intertek Testing Services (ETL) for use with building heating equipment, burning gas as described in NFPA 54 and be listed to UL 1738 / ULC S-636.

C. The complete breeching system shall be fabricated as follows

1. Inner Wall Material
   Sizes 3 inch to 12 inches diameter: 0.020 thick, AL29-4C Stainless Steel or equivalent.
   Sizes 14 inch to 24 inches diameter: 0.024" thick, AL29-4C Stainless Steel or equivalent.

2. Outer Wall Material (with Secure Seal SSD)
   Sizes 3 inch to 10 inch diameter: 0.020" thick, 441 stainless steel or equivalent.
   Sizes 12 inch to 24 inches diameter: 0.024" thick, 441 stainless steel or equivalent.

3. Insulation (with Secure Seal SSD)
   1.0 inch annular air space between walls

4. Venting shall have the following clearances to combustibles.

   Single Wall Secure Seal SS (Fully enclosed, 4 sides):

   Sizes 3 to 24 inches diameter:
   Maximum flue gas temperature 550°F
   Non-combustible enclosure only.

   Single Wall Secure Seal SS (Minimum clearance unenclosed, 2 sides max):

   Sizes 3 to 12 inches diameter:
   Maximum flue gas temperature 550°F
   2 in. horizontal, 2 in. vertical

   Sizes 14 to 24 inches diameter:
   Maximum flue gas temperature 550°F
   4 in. horizontal, 4 in. vertical

Double Wall Secure Seal SSD (Minimum Clearance fully Enclosed 4 sides):

Sizes 3 inches to 12 inches diameter:
Maximum flue gas temperature 550°F
1 inch vertical

Sizes 14 inches to 24 inches diameter:
Maximum flue gas temperature 550°F
1 inch vertical

Double Wall Secure Seal SSD (Minimum clearance unenclosed, 2 sides max):

Sizes 3 inches to 12 inches diameter:
Maximum flue gas temperature 550°F
1 inch horizontal, 1 inch vertical

Sizes 14 inches to 24 inches diameter:
Maximum flue gas temperature 550°F
1 inch horizontal, 1 inch vertical

D. The Breeching shall be guaranteed by the manufacturer to be free from defects due to faulty material or workmanship for a period of 15 years minimum. Terms and conditions for the guarantee shall be as stated in the manufacturer's standard guarantee which must be included with submittal drawings.

E. The complete Breeching System, from appliance outlet to chimney, shall be designed to eliminate on-site welding through the use of a slip fit, rigid connection with reinforcing ribs, built in mechanical locking clips and a Viton® O-ring seal.

1. Silicone gaskets are not allowed due to adverse reactions with sulphuric and carbonic acid.
2. The use of silicon caulking at section joints is not allowed.
3. The system, when sealed, shall maintain airtight integrity at pressures up to 35 inch of water column and be listed for an internal static pressure of 6 inches of water column at 550°F.
4. Horizontal spacing between guides and supports shall be approved for 12 feet.
5. Vertical free standing height above the roof shall be approved for 10 feet.

2.07 ON-SITE FABRICATION – BY OTHERS

A. Fabricate using ASTM A569 carbon steel. Fabricate breechings less than 24 inch diameter of ASTM A527 galvanized sheet steel, lock forming quality with ANSI/ASTM A525 (G90) (G165) zinc coating.

B. Fabricate breechings from following minimum gauges. Refer to SMACNA HVAC Duct Construction Standards – Metal and Flexible.

1. Sizes up to 12 inch: 18 gauge. (0.0478 inch)
2. Sizes 13 inch to 24 inch: 16 gauge. (0.0625 inch)
3. Sizes 25 inch to 36 inch: 14 gauge. (0.0800 inch)
4. Sizes 37 inch to 60 inch: 12 gauge. (0.1055 inch)
5. Sizes over 60 inch: 10 gauge. (0.1345 inch)

C. Provide adjustable self-actuating barometric draft dampers, where indicated, full size of breeching

D. Provide cleanout doors of same gauge as breeching, where indicated on drawings.

E. Weld longitudinal seams. Fabricate joints by welding, tapping and bolting or with companion flanges. For breechings less than 24 inch diameter provide groove seam (pipe lock or flat lock) with end joints beaded and crimped.

F. Reinforce rectangular breeching with angle frames and round breeching with flanged girth joints or angle frames. Refer to SMACNA HVAC Duct Construction Standards – Metal and Flexible.

1. Sizes up to 30 inch: No reinforcing required
2. Sizes 31 inch to 36 inch: 1-1/2 inch X 1-1/2 inch X 3/16 at 60 inches centers.
3. Sizes 37 inch to 60 inch: 2 inch X 2 inch X ¼ inch, at 60 inch centers
4. Sizes over 60 inches X 3 inch X ½ inch, at 60 inch centers.

G. Fabricate breeching fittings to match adjoining breechings. Fabricate elbows with center-line radius equal to breeching (width) (diameter) Limit angular tapers 20 degrees maximum.

2.08 CHIMNEY LINER (For oil and gas) (CT)

A. The chimney liner breeching system components, supports and terminations shall be the product of one manufacturer, shall be fully factory fabricated, shall be laboratory tested and listed by Underwriters Laboratories, Inc. for use with building heating equipment, burning gas or liquid fuels, as described in NFPA 211. Chapter 2.

B. The chimney liner breeching system shall be Underwriters Laboratories, Inc. tested and listed based upon compliance with the UL – 1777 / ULC S-640 and ULC S-636 Standard.

C. The complete breeching system shall be fabricated with 0.024 inch type 316 stainless steel for 4.5 inches to 10 inches diameter, 0.032 inch for 12 inches to 18 inches and 0.040 inch for 20 inches to 24 inches diameter.

D. The complete breeching system, from appliance outlet to chimney, shall be designed to eliminate on-site welding through the use of a 3 inch overlap and locking band. The pipe joints shall be field sealed using SCIL ceramic-fibre, S-650 or S-2000 sealant.

E. The breeching shall be guaranteed by the manufacturer to be free from defects due to faulty material or workmanship for a period of ten (10) years minimum. Terms and conditions for the guarantee shall be as stated in the manufacturer's standard guarantee which must be included with submittal drawings.

F. Detailed manufacturer's submittal drawings shall be provided for approval prior to manufacture or installation of the Breeching System.

G. The manufacturer's representative organization shall provide on-site instructions and technical support services, as required, prior to and during installation of the Breeching System. A sign-off sheet is required. Upon completion of the installation, the manufacturer's representative organization shall certify, in writing, to the Engineer that the Breeching System has been installed properly and in accordance with the manufacturer's installation instructions.

2.09 FORCED DRAFT

A. For forced draft requirements, see boiler room drawing

2.10 OUTER JACKET INSULATION

A. Outer Jacket insulation if shown on drawing, shall be in accordance with Section 232800 paragraph 2.01 part M, see attached section.

2.11 INSTALLATION

A. The manufacturer's representation organization shall provide on-site instructions and technical support services, as required, prior to and during installation of the breeching system. Upon completion of the installation, the manufacturer's representative organization shall certify, in writing, to the Engineer that the Breeching System has been installed properly and in accordance with the manufacturer's installation instructions.

B. The Breeching System shall comply with National Safety Standards and all building codes when installed according to the manufacturer's instructions.

END OF SECTION