

## SECTION 15575 BREECHINGS, CHIMNEYS, AND STACKS

## PART 1 GENERAL

## 1.1 DESCRIPTION OF WORK:

- A. This Section specifies double wall metal vents and accessories for gas-fired appliances.
- B. This Section specifies refractory lined metal breechings, chimneys, and accessories.
- C. This Section specifies field fabricated metal breechings, chimneys, and accessories.

## 1.2 SUBMITTALS:

- A. Product Data: Submit product data including materials, dimensions, weights, sizing, and accessories.
- B. Shop Drawings: Submit shop drawings including required clearances, assembly and installation instructions, and support of components.

- 1. The Sheet Metal Contractor shall submit a computerized vent sizing analysis for the actual boilers and water heaters being furnished. The computer analysis shall list the make, model number, firing rate, and the allowable back pressure for each appliance, the quantity and type of each component, the draft conditions with each appliance firing individually and with all appliances firing. The Contractor shall also provide drawings showing all components and their location in the system.

## NOTE:

- a. All parts exposed to outside atmosphere shall be coated by the installer, with one base coat and one finish coat of Glidden, Metallite, or approved equal.
- b. In lieu of painting all exposed parts, a 304 SS or 316 SS outer may be specified.

## C. Quality Control Submittals:

- 1. Certificates: Submit certificates of materials compliance with specified ASTM, UL, and ASHRAE requirements.
- 2. Certificates: Submit Welders' Qualification Certificates.
- 3. Certificates: Submit complete engineering report certifying that stacks meet the design wind and seismic loads.

- D. Record Drawings: At project closeout, submit record drawings of installed systems products in accordance with requirements of Division 15.

## 1.3 QUALITY ASSURANCE:

- A. Welder's Qualifications: All welders shall be certified in accordance with AWS Standard D9.1, Specifications for Welding Sheet Metal.

## B. Codes and Standards:

- 1. NFPA: Comply with NFPA 211 "Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances."

2. UL: Comply with applicable portions of UL safety standards; provide products which have been UL listed and labeled.
3. SMACNA: Comply with SMACNA Low Pressure Duct Standards for fabricated breeching and smokepipe.
4. AWS: Comply with AWS Structural Welding Code for welders' qualifications, welding details, and workmanship standards.
5. ASHRAE: Comply with the ASHRAE Equipment Handbook, Chapter 27, for Chimney, Gas Vent, and Fireplace Systems, material requirements and design criteria.
6. UMC: Comply with I.A.P.M.O. Uniform Mechanical Code for chimney application and requirements of stack type, height and clearances.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

- 1 Manufacturers: Subject to compliance with requirements, provide products by one of the following:

A. Double Wall Metal Vents:

1. American Metal Products Co.; Div. of Masco Corp.
2. General Products Co., Inc.
3. Hart & Cooley Mfg. Co.
4. Metal Fab
5. Selkirk Metalbestos.
6. Simpson Dura-Vent.

B. Refractory Lined Metal Breechings and Chimneys:

1. Power Pac Enterprises, Ltd.
2. Susquehanna Concrete Products, Inc.
3. Van-Packer Co.
4. Stacks, Inc., Div of Air Management, Inc.

C. Fabricated Metal Breechings and Chimneys:

1. American Metal Products Co.; Div. of Masco Corp.

2.2 DOUBLE WALL METAL VENTS:

A. Type B Gas Vents (Gas-Burning Appliances Only):

1. Description: Double wall gas vents, UL listed for Type B, consisting of an inner pipe of sheet aluminum, and outer pipe of galvanized sheet steel, with the following minimum thicknesses:

<u>Size</u>	<u>Inner Pipe</u>	<u>Outer Pipe</u>
Round, up to 6"	0.012"	28 gauge
Round, 7" to 18"	0.014"	28 gauge
Round, 20" to 24"	0.018"	26 gauge
Oval, up to 4"	0.012"	28 gauge
Oval, 5" to 6"	0.014"	28 gauge

2. Accessories: UL-labeled tees, elbows, increasers, draft hood connectors, metal cap with bird barrier, adjustable roof flashing, storm collar, support assembly, thimbles, fire stop spacers, and fasteners, fabricated of similar materials and designs as vent pipe straight sections.
- B. All Steel, Positive Pressure, Double and Triple Wall Vents:
1. Description: UL-labeled double and triple wall metal stacks for use with building heating equipment burning gas, solid, or liquid fuels not exceeding 1000 degrees F. continuous and capable of maintaining airtight integrity at pressures up to 72inches W.C. as described in NFPA 211 and UL 103.
  2. Construction: All stacks and breechings will have inner walls of 20 ga. (Type 304 Stainless Steel for gas and No. 2 Oil) or (Type 316 Stainless Steel for solid fuels, or No. 4 thru No. 6 Oil). The outer jacket shall be 24 ga. aluminum coated steel for sizes up to 24inches I.D. and 20 ga. for sizes 26inches I.D. and larger. There shall be minimum 1" air space between the inner and outer walls.
  3. Accessories: UL-labeled tees, elbows, increasers, draft hood connectors, metal cap with bird barrier, adjustable roof flashing, storm collar, support assembly, thimbles, fire stop spacers, and fasteners fabricated of similar materials and designs as vent pipe straight sections.
- 2.3 REFRACTORY LINED METAL BREECHINGS AND CHIMNEYS:
- A. Design Loads:
1. Wind Loading: 110 mph.
  2. Seismic Loading: Zone 1.
- B. Steel Jacket:
1. Chimney Outer Jacket:
    - a. 26 gauge aluminized steel with riveted seams.
    - b. 11 gauge galvanized steel with welded seam joint.
  2. Breeching Outer Jacket: 11 gauge galvanized steel with welded seams.
- C. Refractory Lining:
1. Tested under UL Standard 959 for temperature and acid resistance, and bearing the testing laboratory label.
  2. Temperature: Withstand 1800 degrees F continuous firing, and 2000 degrees F intermittent firing without fusion.
  3. Acid Extraction: Maximum of 0.2 percent.
  4. Cold Crushing Strength: Minimum of 3,200 psi.
  5. Bond refractory lining to steel jacket so finished product may be shipped, handled, and installed with no separation.
  6. Thickness: Minimum of 2inches.

- 7. Finishing: Factory-applied, high heat resistant paint, color as selected by the Architect/Engineer.

D. Accessories: Provide accessories bearing UL label.

- 1. Base Section: Provide acid resistant coated cast-iron anchor lugs for securing stack to foundation.
- 2. Cleanout Section: Provide smoke-tight cleanout section with gasketed and bolt-tightened inspection plate. Weld neck to stack section.
- 3. Tee or Wye Section: smoke-tight tee or wye as indicated for breeching connection, with welded joints, refractory lining, finished with smooth transition, and with no exposed metal on inside.
- 4. Spark Screen: Type 304 stainless steel, 16 gauge, 1/2 x 1/2 inches mesh, with Type 304 stainless steel rolled angle and drawband.
- 5. Guy bands: 8inches wide bands of same material as jacket, fastened with nuts and bolts for tight fit.
- 6. Roof Penetration: factory fabricated thimble, flashing, and counterflashing.

E. Fabrication:

- 1. Fabricate sections, fittings, and accessories as individual pieces or in combination lengths for field handling.
- 2. Fabricate components with centrifugally cast lining in lengths suitable for connection with drawband. Bond refractory with calcium aluminate cement.
- 3. Fabricate chimneys with anchor lugs, cleanout, T- sections, flashing and counterflashing, and provisions for support, expansion, and contraction.
- 4. Fabricate breechings with support lug for attachment to building structure so as not to exceed permissible loading at appliance and chimney.

2.4 FABRICATED METAL BREECHINGS AND CHIMNEYS:

A. Materials:

- 1. Black, carbon, hot-rolled steel complying with ASTM A 569, except breechings less than 24inch diameter (or longest side) may be galvanized sheet steel complying with ASTM A 527, lock forming quality with ASTM A 525, G90 zinc coating, mill phosphated.
- 2. Minimum gauges for corresponding sizes as indicated (diameter or longest side dimension):

<u>SIZES</u>	<u>THICKNESS - Gauge</u>
up to 12"	18
13" to 24"	16
25" to 36"	14
37" to 60"	12
over 60"	10

## B. Fabrication:

1. Shop fabricate breechings and chimneys in as complete as possible to minimize field welding. Match-mark sections for field assembly and coordination of installation.
2. Longitudinal Seams: welded, except longitudinal seams for breechings less than 24 inches diameter (or longest side) may be Acme grooved type.
3. End joints: weld, lap and bolt, or use companion flanges; except breechings less than 24 inches diameter (or longest side) may have end joints beaded and crimped.
4. Reinforcement: Reinforce rectangular breechings with angle frames as follows for corresponding long side dimensions; and reinforce round breechings with either flanged girth joints or angle frames as follows for corresponding diameter:

<u>SIZES</u>	<u>REINFORCING</u>	<u>INTERVAL</u>
up to 30"	No reinforcing required.	
31" to 36"	1-1/2" x 1-1/2" x 3/16"	30" o.c.
37" to 60"	2" x 2" x 1/4"	30" o.c.
over 60"	3" x 3" x 1/2"	30" o.c.

5. Fabricate breeching and chimneys fittings to match adjoining materials. Except as otherwise indicated, fabricate elbows with centerline radius equal to associated breeching width. Limit angular tapers to 20 degrees maximum for expanding tapers. Install accessories during fabrication to greatest extent possible.

## C. Accessories and Specialties:

1. Provide accessories and specialties of types and sizes required to comply with breeching requirements including proper connection of equipment.
2. Barometric Dampers: adjustable, self-actuating draft dampers, where indicated, full size of breeching.
3. Cleanout Doors: same gauge as breeching; size and location as indicated.
4. Thermally Actuated Vent Dampers: same size as draft hood collar; constructed of stainless steel housing and brackets. Secure 4 quadrants to brackets constructed of corrosion resistant bi-metal. Secure brass weights to quadrants to prevent vibrations and noise during high draft conditions. Test units in accordance with AGA standards, and certify design complies with ANSI Z21.68.

## PART - 3 EXECUTION

## 3.1 INSTALLATION OF DOUBLE WALL CONNECTORS, BREECHINGS AND VENTS:

- A. Install Type B gas vents in accordance with manufacturer's installation instructions and UL listing. Maintain minimum clearances from combustibles specified in UL listing.
- B. Install all steel, positive pressure, double and triple wall gas vents in accordance with manufacturer's installation instructions and UL listing. Maintain minimum clearances from combustibles specified in UL listing. The system shall have a 10 inch minimum clearance to combustibles with flue gases not exceeding 1000 degrees F. continuous.

- C. Seal joints between sections of positive pressure vents in accordance with manufacturer's installation instructions, and using only sealants recommended by manufacturer. The inner pipe joints shall be field sealed with Containment Bands and high temperature sealant.
  - D. Support vents at intervals recommended by the manufacturer to support the weight of the vent and all accessories, without exceeding loading of appliances. Stacks extending above the roof must terminate a minimum of 3feet-0inches above the roof or parapet per NFPA 211, or as required by local code.
  - E. Provide guy wire support of roof stacks in accordance with manufacturer's recommendations.
- 3.2 INSTALLATION OF REFRACTORY LINED BREECHINGS AND CHIMNEYS:
- A. Assemble and erect stack sections and accessories in accordance with the manufacturer's written instructions and in compliance with UL listing. Connect base section to foundation using anchor lugs of size and number recommended by manufacturer.
  - B. Joints:
    - 1. Join sections with acid-resistant joint cement to provide continuous joint and smooth interior finish.
    - 2. Weld joints. Comply with the workmanship quality standards specified in AWS D9.1, Specifications for Welding of Sheet Metal.
  - C. Erect chimneys level and plumb to finished tolerance of no more than 1inch out of plumb from top to bottom.
  - D. Erect breechings with a slope down to appliance, with condensate drain connection. Pipe drain line to nearest open site drain.
  - E. Field painting is specified in Division 9 including touch- up or refinishing sections or accessories that are scratched or marred during shipping and handling, or require touch-up after welding.
- 3.3 INSTALLATION OF FABRICATED BREECHINGS AND CHIMNEYS:
- A. Assemble and erect fabricated breechings and chimneys in accordance with SMACNA Low Pressure Duct Construction Standards.
  - B. Joints: Weld joints in conformance with AWS workmanship standards of AWS D 9.1, Specification for Welding Sheet Metal.
  - C. Align breechings accurately at connections, with a smooth internal surface and a 1/8inch misalignment tolerance.
  - D. Slope breechings down to appliances and provide a condensate drain connection. Pipe drain line to nearest open site drain.
  - E. Install concrete inserts for support of breeching in coordination with formwork.
  - F. Install accessories, dampers, fans, equipment, controls, and other supports.
  - G. Anchor breechings to building structure with bolts, concrete inserts, steel expansion anchors (not lead-shield type), welded studs, C-clamps or special beam clamps.
  - H. Vertical Breechings:

1. Support at 12 foot intervals, by attachment to adjacent vertical structural surfaces or by direct bearing at floor penetrations and similar locations.
  2. Breechings up to 24inch x 20inch: use 1-1/2inch x 16 gauge straps or formed angles.
  3. Breechings larger than 24inch x 20inch: use steel angle brackets 1inch x 1/8inch for sizes up to 36inch x 18inch; 1-1/2inch x 1/8inch for larger sizes.
- I. Horizontal breechings located against structural walls and other similar adjacent vertical surfaces:
1. Support at 8 foot intervals for units up to 40inch horizontal dimensions, and 4 foot intervals for larger breechings.
  2. Where width is less than height: support with 1-1/2inch x 16 gauge straps.
  3. Where width is more than height: support with shelf- type fabricated angle brackets; 1" x 1/8" for widths up to 18inches; 1-1/2inch x 1/8inch for greater widths.
- J. Horizontal Rectangular Breechings:
1. Support from overhead structure with hangers at 10 foot intervals for unit widths up to 60inches, and 8 foot intervals for larger breechings.
  2. Support breechings directly with 1inch x 16 gauge straps up to 60inches width, and with 1-1/2inch x 12 gauge straps up to 96inch width, bolted to breechings.
- K. Trapeze Hangers:
1. Support breechings with horizontal angle members and vertical support members of sizes listed below (long side dimensions):
    - a. Up to 30 inches size: 1inch x 1/8inch angle, with 1inch x 18 gauge or 1/4inch diameter hangers.
    - b. 31inches to 60 inches size: 1-1/2inch x 1/8inch angle, with 1-1/2inch x 16 gauge or 3/8inch diameter hangers.
    - c. 61inches to 84inches size: 2inch x 1/8inch angle, with 1-1/2inch x 14 gauge or 1/2inch diameter hangers.
    - d. Over 84 inches size: 2inch x 1/4inch angle, with 5/8inch diameter hangers, except as otherwise shown.
- L. Horizontal Round Breechings:
1. Support with girth strap and strap hanger (of same size); except for sizes over 50inches in diameter. Install pair of strap hangers bolted to opposite sides of angle reinforcing rings or flanged joints. Support breechings at 10 foot intervals with hangers as follows for corresponding diameters.
    - a. Up to 30inch diameter: 1inch x 16 gauge strap hangers.
    - b. 31inches to 50inches diameter: 1-1/2inch x 16 gauge strap hangers.
    - c. 51" to 84" diameter: Pairs of 1-1/2inch x 16 ga
    - d. hangers.

3.4 INSTALLATION OF DAMPERS:

- A. Install barometric and thermostatically operated dampers in accordance with manufacturer's instructions. Locate as close to draft hood collar as possible.

3.5 ADJUSTING AND CLEANING:

- A. Clean breechings internally during installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth.

3.6 PROTECTION:

- A. Temporary Closure: At ends of breechings and chimneys which are not completed or connected to equipment, provide temporary closure which will prevent entrance of dust and debris until installations are completed.

END OF SECTION 15575