

**University of Houston Master Specification**

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<Insert U of H Proj #>

<Insert Issue Name>  
<Insert Issue Date>

SECTION 23 5100 – CHIMNEYS, BREECHINGS, AND STACKS

**Revise this Section by deleting and inserting text to meet Project-specific requirements.**

**This Section uses the term "Engineer." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.**

**Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.**

**Delete hidden text after this Section has been edited for the Project.**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
  - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
  - 2. The University of Houston's Supplemental General Conditions and Special Conditions for Construction.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Listed double-wall **[vents] [chimneys]**.
  - 2. Field-fabricated metal breechings **[and chimneys]**.
  - 3. Listed **[grease] [dishwasher] [grease and dishwasher]** ducts.

1.3 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and Workmanship shall comply with the applicable requirements and standards addressed within the following references:
  - 1. NFPA: Comply with NFPA 211 "Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances".

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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 smoke pipe.
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.

### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain listed system components through one source from a single manufacture.
- B. Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports and AWS D9.1, "Sheet Metal Welding Code," for shop and field welding of joints and seams in vents, breechings, and stacks.
- C. Certified Sizing Calculations: Manufacturer shall certify venting system sizing calculations.

### 1.5 SUBMITTALS

- A. Product Data: Furnish product data for the following:
  1. Type B and BW vents.
  2. Type L vents.
  3. Special gas vents.
  4. Building-heating-appliance chimneys.
  5. Grease ducts.
  6. Guy wires and connectors, and installation details.
- B. Documents:
  1. Shop Drawings for vents, breechings, chimneys, and stacks. Include drawings, elevations, sections, details, and attachments to other Work.
  2. Details of equipment assemblies that indicate dimensions, weights, loads, required clearances, methods of field assembly, components, hangers and restraints, including the location and the size of each field connection.

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3. For installed products indicated to comply with design loads, include calculations and structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

4. Welding certificates.

### 1.6 DELIVERY, STORAGE AND HANDLING

A. The Work of this Section shall be coordinated with other trades affecting, or affected by this Work, to assure the steady progress of all Work performed under the Contract.

B. Replace any sections or assemblies damaged during shipment, storage or handling with new identical factory-supplied components.

C. Protect finishes from physical damage by leaving factory packing cases in place before installation and providing temporary protective covers after installation with on-going construction within the Project Site.

### 1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of venting system that fail in materials or Workmanship within specified warranty period. Failures include, but are not limited to, structural failures caused by expansion and contraction.

B. Warranty Period: **[10] [15] [25] <Insert number>** years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

### 2.2 MANUFACTURERS

A. American Metal Products; MASCO Corporation.

B. Metal-Fab, Inc.

C. ProTech Systems Inc. (Special Gas Vent) (Grease Ducts).

D. Heat-Fab Inc (Special Gas Vent) (Grease Ducts).

E. Selkirk Inc.; Selkirk Air Mate.

F. Simpson Dura-Vent Co., Inc.; Subsidiary of Simpson Manufacturing Co.

G. Van-Packer Co.

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### 2.3 LISTED TYPE B AND BW VENTS

- A. Description: Double-wall metal vents tested according to UL 441 and rated for **[480 degrees F continuously for Type B], or [550 degrees F continuously for Type BW]**; with neutral or negative flue pressure complying with NFPA 211 and suitable for certified gas-fired appliances.
- B. Construction: Inner shell and outer jacket separated by at least a 1/4-inch airspace.
- C. Inner Shell: **[ASTM B 209, Type 1100 aluminum] [ASTM B 209, Type 3003 aluminum] [ASTM B 209, Type 3105 aluminum] [ASTM A 666, Type 430 stainless steel]**.
- D. Outer Jacket: **[Galvanized] [Aluminized]** steel.
- E. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight Sections; all listed for same assembly.
  - 1. Termination: Stack cap designed to exclude 90 percent of rainfall.
  - 2. Termination: Round chimney top designed to exclude 98 percent of rainfall.
  - 3. Termination: **[Insert special type termination or delete this option from specification.]**

### 2.4 LISTED TYPE L VENT

- A. Description: Double-wall metal vents tested according to UL 641 and rated for 570 degrees F continuously or 1700 degrees F for 10 minutes; with neutral or negative flue pressure complying with NFPA 211 and suitable for low-heat appliances.
- B. Construction: Inner shell and outer jacket separated by at least a **[1/4-inch] [1-inch] [2-inch] [4-inch]** airspace filled with high-temperature, **[ceramic-fiber] [mineral-wool]** insulation.
- C. Inner Shell: ASTM A 666, Type **[304] [316]** stainless steel.
- D. Outer Jacket: **[Galvanized] [Aluminized] [Stainless]** steel.
- E. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
  - 1. Termination: Stack cap designed to exclude 90 percent of rainfall
  - 2. Termination: Round chimney top designed to exclude 98 percent of rainfall.
  - 3. Termination: Exit cone with drain section incorporated into riser.
  - 4. Termination: **[Insert special type termination or delete this option from specification.]**

### 2.5 LISTED SPECIAL GAS VENT

- A. Manufacturers:
  - 1. Heat-Fab Inc.

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2. Metal-Fab, Inc.
  3. ProTech Systems Inc.
  4. Z-FLEX.
- B. Description: Double-wall metal vents tested according to UL 1738 and rated for 480 degrees F continuously, with positive or negative flue pressure complying with NFPA 211 and suitable for condensing-gas appliances.
- C. Construction: Inner shell and outer jacket separated by at least a 1/2-inch airspace.
- D. Inner Shell: ASTM A 959, Type 29-4C stainless steel.
- E. Outer Jacket: **[Aluminized] [Stainless]** steel.
- F. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight Sections; all listed for same assembly.
1. Termination: Stack cap designed to exclude 90 percent of rainfall.
  2. Termination: Round chimney top designed to exclude 98 percent of rainfall.
  3. Termination: Exit cone with drain Section incorporated into riser.
  4. Termination: **[Insert special type termination or delete this option from specification.]**

2.6 LISTED BUILDING-HEATING-APPLIANCE CHIMNEYS

- A. Description: Double-wall metal vents tested according to UL 103 and rated for 1000 degrees F continuously or 1700 degrees F for 10 minutes; with neutral or negative flue pressure complying with NFPA 211 and suitable for dual-fuel boilers, oven vents, water heaters, or exhaust for engines.
- B. Construction: Inner shell and outer jacket separated by at least a **[1/2-inch] [1-inch] [2-inch] [3-inch] [4-inch]** annular space **[filled with high-temperature, ceramic-fiber insulation]**.
- C. Inner Shell: ASTM A 666, Type **[304] [316]** stainless steel.
- D. Description: Double-wall metal vents tested according to UL 103 and 959 and rated for 1400 degrees F continuously or 1800 degrees F for 10 minutes; with positive or negative flue pressure complying with NFPA 211 and suitable for dual-fuel boilers, oven vents, water heaters, or exhaust for engines.
- E. Construction: Inner shell and outer jacket separated by at least a **[1-inch] [2-inch] [3-inch] [4-inch]** annular space filled with high-temperature, ceramic-fiber insulation.
- F. Inner Shell: ASTM A 666, Type **[304] [316]** stainless steel.

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- G. Description: Double-wall metal vents tested according to UL 103 and rated for 1000 degrees F continuously, or 2100 degrees F for 10 minutes; with neutral or negative flue pressure complying with NFPA 211 and suitable for fireplaces and other solid-fuel-burning appliances
- H. Construction: Inner shell and outer jacket separated by at least a **[1-inch] [1-1/2-inch] [2-inch] [4-inch]** annular space filled with high-temperature, ceramic-fiber insulation.
- I. Inner Shell: **[ASTM A 666, Type 304] [ASTM A 666, Type 316] [ASTM A 240/A 240M, Type 430]** stainless steel.
- J. Outer Jacket: **[Galvanized] [Aluminized] [Stainless]** steel.
- K. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight Sections; all listed for same assembly.
  - 1. Termination: Stack cap designed to exclude 90 percent of rainfall.
  - 2. Termination: Round chimney top designed to exclude 98 percent of rainfall.
  - 3. Termination: Exit cone with drain Section incorporated into riser.
  - 4. Termination: **[Insert special type termination or delete this option from specification.]**

### 2.7 LISTED GREASE DUCTS

- A. Description: Double-wall metal vents tested according to UL 1978 and rated for 500 degrees F continuously, or 2000 degrees F for 30 minutes; with positive or negative duct pressure and suitable for Type I, commercial kitchen grease duct.
- B. Construction: Inner shell and outer jacket separated by at least a **[1-inch] [2-inch] [3-inch] [4-inch]** annular space filled with high-temperature, ceramic-fiber insulation.
- C. Inner Shell: ASTM A 666, Type **[304] [316]** stainless steel.
- D. Outer Jacket: **[Aluminized] [Stainless]** steel.
- E. Accessories: Tees, elbows, increasers, hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight Sections; all listed for same assembly. Include unique components required to comply with NFPA 96.

### 2.8 FIELD-FABRICATED METAL BREECHINGS AND CHIMNEYS

- A. Fabricate freestanding chimneys according to SMACNA's "Guide for Steel Stack Design and Construction." Design for minimum <feet> high and <Insert inches> in diameter.
- B. Fabricate breechings and chimneys from ASTM A 569/A 569M hot-rolled steel with continuously welded joints, complying with NFPA 211 for minimum metal thickness.
  - 1. Equal to or Less Than 1.069 Sq. Ft. or 14 Inches in Diameter: 0.053 inch.

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2. Up to 1.396 Sq. Ft. or 16 Inches in Diameter: 0.067 inch.
  3. Up to 1.7 Larger Than above: 0.123 inch.
  4. 64 Sq. Ft. or 18 Inches in Diameter: 0.093 inch.
- C. Fabricate chimneys and vent connectors from galvanized steel, complying with NFPA 211 for minimum metal thickness.
1. Equal to or Less Than 6 Inches in Diameter: 0.019 inch.
  2. Up to 10 Inches in Diameter: 0.024 inch.
  3. Up to 16 Inches in Diameter: 0.029 inch.
  4. Larger Than above: 0.056 inch.
- D. Fabricate chimneys and vent connectors from ASTM B 209, Type 1100 or 3003, aluminum or stainless steel, complying with NFPA 211 for the following minimum metal thicknesses:
1. Aluminum: 0.027 inch.
  2. Stainless Steel: 0.012 inch.
- E. Fabricate cleanout doors from compatible material, same thickness as breeching, bolted and it also incorporates a gasket seal.

### 2.9 GUYING AND BRACING MATERIALS

- A. Cable: **[Three] [Four]** <Insert number> galvanized, stranded wires of the following thickness:
1. Minimum Cable Size: 1/4 inch in diameter.
  2. For stack ID sizes 4 to 15 Inches: use 5/16 inch.
  3. For stack ID sizes 18 to 24 Inches: use 3/8 inch.
  4. For stack ID sizes 27 to 30 Inches: use 7/16 inch.
  5. For stack ID sizes 33 to 36 Inches: use 1/2 inch.
  6. For stack ID sizes 39 to 48 Inches: use 9/16 inch.
  7. For stack ID sizes 51 to 60 Inches: use 5/8 inch.
- B. Pipe: **[Two] [Three]** <Insert number> galvanized steel, NPS 1-1/4.
- C. Angle Iron: **[Two] [Three]** <Insert number> galvanized steel, 2 by 2 by 0.25 inch.

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### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions that may affect performance of Work.
- B. Contractor shall furnish supervision and provide labor for installation of the Work. Contractor shall field check the Work prior to start-up and commissioning of equipment or appliance connected to the Work such as vents, breechings, chimneys, grease ducts or stacks.

#### 3.2 INSTALLATION

##### A. Vents and Chimneys:

- 1. Locate to comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211, whichever is most stringent.
- 2. Seal between Sections of positive-pressure vents according to manufacturer's written installation instructions, using sealants recommended by manufacturer.
- 3. Support vents at intervals recommended by the manufacturer to support weight of vents and all accessories, without exceeding appliance loading.
- 4. Properly slope breechings in accordance with manufacturer's or Architect/Engineer recommendations, and install condensate a drain connection at the lowest point and piped to nearest drain.
- 5. Connect base sections of chimneys to foundation using anchor lugs of size and number recommended by manufacturer or Architect/Engineer.
- 6. Join sections with acid-resistant joint cement to provide continuous joint and smooth interior finish.
- 7. Erect stacks plumb to finished tolerance of no more than **[1, 1.5, 1.75] < Insert number >** inch out of plumb from top to bottom.

##### B. Field-Fabricated Breechings and Chimneys:

- 1. Suspend breechings and chimneys independent of their appliance connections.
- 2. Install, support, and restrain according to manufacturer's or Architect/Engineer's requirements.
- 3. Align breechings at connections, with smooth internal surface and maximum 1/8-inch misalignment tolerance.
- 4. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest drain.

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5. Support breechings and chimneys from building structure with bolts, concrete inserts, steel expansion anchors, welded studs, C-clamps, or beam clamps according to manufacturer's written instructions.

**3.3 CLEANING**

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.
- B. Clean breechings internally, during and after installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth and apply touchup finish to match factory or shop finish.
- C. Provide temporary closures at ends of breechings, chimneys, and stacks that are not completed or not completely connected to equipment or appliance.

END OF SECTION 23 5100