SECTION 235133 - INSULATED SECTIONAL CHIMNEYS

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on Masterworks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on Masterworks/Supporting Information.

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.

1.2 SUMMARY

A. Section Includes:

1. Listed chimney liners.
2. Listed building-heating-appliance chimneys.
3. Listed, refractory-lined stacks.
4. Field-fabricated metal chimneys.
5. Guying and bracing materials.

B. Related Requirements:

1. Section 235113.11 "Draft Control Fans" for draft inducer fans, venturi-draft inducer fans, mechanical-draft vent fans, vent exhaust fans, and combustion-air fans.
2. Section 235113.16 "Vent Dampers" for motorized and barometric dampers.
3. Section 235116 "Fabricated Breechings and Accessories" for listed, refractory-lined metal breechings and field-fabricated metal breechings.
4. Section 235123 "Gas Vents" for Type B and BW vents, Type L vents, and listed special gas vents.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for product.

B. Shop Drawings: For chimneys and stacks.

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Detail fabrication and assembly of hangers and seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Seismic Qualification Certificates: For factory-fabricated chimneys and stacks, accessories, and components from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity, and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Sample Warranty: For special warranty.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D9.1/D9.1M, "Sheet Metal Welding Code," for shop and field welding of joints and seams in stacks.

B. Certified Sizing Calculations: Manufacturer shall certify venting system sizing calculations.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of venting system that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, structural failures caused by expansion and contraction.
2. Warranty Period: [**10**] [**15**] [**25**] <**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LISTED CHIMNEY LINERS

A. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Description: [**Straight**] [**Corrugated**], single-wall chimney liner tested according to UL 1777 and rated for 1000 deg F (538 deg C) continuously or 2100 deg F (1150 deg C) for 10 minutes; with negative or positive flue pressure complying with NFPA 211.

C. Straight Liner Materials: ASTM A 666, [**Type 304**] [**Type 316**] stainless steel.

D. Corrugated Liner Materials: [**ASTM A 240/A 240M, Type 321**] [**ASTM A 240/A 240M, Type 430**] [**ASTM A 959, Type 29-4C**] stainless steel.

E. Accessories:

1. Fittings: Tees, elbows, increasers, draft-hood connectors, metal caps with bird barriers, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar or compatible materials and designs.
2. Sealant: Manufacturer's standard high-temperature sealant.
3. Insulating Fill: Manufacturer's standard high-temperature insulation fill material in annular space surrounding chimney liner, including high-temperature, ceramic-fiber insulation required to seal chimney at top and bottom.

2.2 LISTED BUILDING-HEATING-APPLIANCE CHIMNEYS

A. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Description: Double-wall metal vents tested according to UL 103 and rated for 1000 deg F (538 deg C) continuously or 1700 deg F (926 deg C) for 10 minutes; with neutral or negative flue pressure complying with NFPA 211.

C. Construction: Inner shell and outer jacket separated by at least a [**1/2-inch (25-mm)**] [**1-inch (50-mm)**] [**2-inch (50-mm)**] [**3-inch (75-mm)**] [**4-inch (100-mm)**] annular space[**filled with high-temperature, ceramic-fiber insulation**].

D. Inner Shell: ASTM A 666, [**Type 304**] [**Type 316**] stainless steel.

E. Description: Double-wall metal vents tested according to UL 103 and UL 959 and rated for 1400 deg F (760 deg C) continuously or 1800 deg F (982 deg C) for 10 minutes; with positive or negative flue pressure complying with NFPA 211.

F. Construction: Inner shell and outer jacket separated by at least a [**1-inch (25-mm)**] [**2-inch (50-mm)**] [**3-inch (75-mm)**] [**4-inch (100-mm)**] annular space filled with high-temperature, ceramic-fiber insulation.

G. Inner Shell: ASTM A 666, [**Type 304**] [**Type 316**] stainless steel.

H. Description: Double-wall metal vents tested according to UL 103 and rated for 1000 deg F (538 deg C) continuously or 2100 deg F (1150 deg C) for 10 minutes; with neutral or negative flue pressure complying with NFPA 211.

I. Construction: Inner shell and outer jacket separated by at least a [**1-inch (25-mm)**] [**1-1/2-inch (38-mm)**] [**2-inch (50-mm)**] [**4-inch (100-mm)**] annular space filled with high-temperature, ceramic-fiber insulation.

J. Inner Shell: [**ASTM A 666, Type 304**] [**ASTM A 666, Type 316**] [**ASTM A 240/A 240M, Type 430**] stainless steel.

K. Outer Jacket: [**Galvanized**] [**Aluminized**] [**Stainless**] steel.

L. 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 minimum 90 percent of rainfall.
2. Termination: Round chimney top designed to exclude minimum 98 percent of rainfall.
3. Termination: Exit cone with drain section incorporated into riser.
4. Termination: <**Insert termination**>.

2.3 LISTED, REFRACTORY-LINED METAL CHIMNEYS

A. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Comply with ASME STS-1.

C. Design Wind Loads: [**150 mph (241 km/h)**] <**Insert wind speed**>.

D. Design for seismic conditions at Project site.

E. Chimney Outer Jacket: [**Aluminized**] [**Galvanized**] steel with [**riveted**] [**welded**] seams.

F. Refractory Lining: Tested according to UL 959 for temperature and acid resistance and bearing the testing laboratory label.

1. Temperature Rating: 1800 deg F (982 deg C) continuously and 2000 deg F (1093 deg C) intermittently.
2. Acid Extraction: Maximum of 0.2 percent.
3. Cold Crushing Strength: Minimum of 3200 psig (22 MPa).
4. Thickness: Minimum of 2 inches (50 mm).

G. Finish: Factory-applied, high-heat-resistant paint; color as selected by Architect.

H. Base Section: Acid-resistant-coated, cast-iron anchor lugs for securing stack to foundation[**with anchorage designed by manufacturer**].

I. Reinforced Cleanout Section: Smoke-tight connection, with gasketed and bolt-tightened inspection plate; neck shall be welded to stack section.

J. T or Y Sections: Smoke-tight connection, with welded joints and refractory lining; finished with smooth transition and with no exposed metal on inside.

K. Spark Screen: ASTM A 666, Type 316 stainless steel; 0.0625 inch (1.6 mm) thick; maximum 1/2-by-1/2-inch (13-by-13-mm) mesh; with ASTM A 666, Type 304 stainless-steel rolled angle and drawband.

L. Guy Bands: 8-inch- (200-mm-) wide bands of same material as jacket, with bolted fasteners.

M. Roof Penetration: Factory-fabricated thimbles, flashings, and counterflashings.

N. Fabricate sections, fittings, and accessories as individual pieces or in combination lengths for field handling.

O. Fabricate components with centrifugally cast refractory lining in lengths suitable for connection with drawbands.

P. Bond refractory to steel jacket with calcium aluminate cement to prevent separation in finished product during shipping, handling, and installation.

Q. Fabricate stacks with anchor lugs; cleanout; T sections; flashings and counterflashings; and provisions for support, expansion, and contraction.

2.4 FIELD-FABRICATED METAL CHIMNEYS

A. Fabricate freestanding chimneys according to SMACNA's "Guide for Free Standing Steel Stack Construction." Design for minimum <**Insert feet (meters)**> high and <**Insert inches (mm)**> in diameter.

B. Fabricate chimneys from ASTM A 1011/A 1011M 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. (0.099 Sq. m.) or 14 Inches (356 mm) in Diameter: 0.053 inch (1.35 mm).
2. Up to 1.396 Sq. Ft. (0.129 Sq. m) or 16 Inches (406 mm) in Diameter: 0.067 inch (1.7 mm).
3. Up to 1.764 Sq. Ft. (0.164 Sq. m.) or 18 Inches (457 mm) in Diameter: 0.093 inch (2.36 mm).
4. Larger Than: 0.123 inch (3.12 mm).

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 (152 mm) in Diameter: 0.019 inch (0.48 mm).
2. Up to 10 Inches (254 mm) in Diameter: 0.024 inch (0.61 mm).
3. Up to 16 Inches (406 mm) in Diameter: 0.029 inch (0.74 mm).
4. Larger Than: 0.056 inch (1.42 mm).

D. Fabricate chimneys and vent connectors from ASTM B 209 (B 209M), Type 1100 or 3003, aluminum or stainless steel, complying with NFPA 211 for the following minimum metal thicknesses:

1. Aluminum: 0.027 inch (0.69 mm).
2. Stainless Steel: 0.012 inch (0.31 mm).

E. Fabricate cleanout doors from compatible material, same thickness as breeching, bolted and gasketed.

F. Fabricate engine exhaust from ASTM A 53/A 53M, Type E (electric-resistance welded), Grade B; or ASTM A 106/A 106M, Type S, Grade B, [**Schedule 40**] [**Schedule 80**] pipe; with welded joints and carbon-steel fittings and flanges.

1. Wrought-Steel Fittings: ASME B16.9, wall thickness to match adjoining pipe.
2. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, Class 150, including bolts, nuts, and gaskets.

2.5 GUYING AND BRACING MATERIALS

A. Cable: [**Three**] [**Four**] <**Insert number**> galvanized, stranded wires of the following thickness:

1. Minimum Size: 1/4 inch (6 mm) in diameter.
2. For ID Sizes 4 to 15 Inches (100 to 381 mm): 5/16 inch (8 mm).
3. For ID Sizes 18 to 24 Inches (457 to 610 mm): 3/8 inch (9.5 mm).
4. For ID Sizes 27 to 30 Inches (685 to 762 mm): 7/16 inch (11 mm).
5. For ID Sizes 33 to 36 Inches (838 to 915 mm): 1/2 inch (13 mm).
6. For ID Sizes 39 to 48 Inches (990 to 1220 mm): 9/16 inch (14.3 mm).
7. For ID Sizes 51 to 60 Inches (1295 to 1524 mm): 5/8 inch (16 mm).

B. Pipe: [**Two**] [**Three**] <**Insert number**> galvanized steel, NPS 1-1/4 (DN 32).

C. Angle Iron: [**Two**] [**Three**] <**Insert number**> galvanized steel, 2 by 2 by 0.25 inch (50 by 50 by 6 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATION

A. Listed Chimney Liners: High-efficiency boiler or furnace vents in masonry chimney.

B. Listed Building-Heating-Appliance Chimneys: Dual-fuel boilers, oven vents, water heaters, exhaust for engines, fireplaces, and other solid-fuel-burning appliances.

C. Listed, Refractory-Lined Metal Chimneys: Freestanding dual-fuel boiler vents, oven vents, water heaters, exhaust for engines, fireplaces, and other solid-fuel-burning appliances.

D. Field-Fabricated Metal Chimneys: Dual-fuel boilers, oven vents, water heaters, exhaust for engines, fireplaces, and other solid-fuel-burning appliances.

3.3 INSTALLATION OF LISTED CHIMNEYS

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Comply with requirements in [**Section 033000 "Cast-in-Place Concrete"**] [**Section 033053 "Miscellaneous Cast-in-Place Concrete"**] for concrete, reinforcement, and formwork.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

C. Comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211, whichever is most stringent.

D. Seal between sections of positive-pressure vents according to manufacturer's written installation instructions, using sealants recommended by manufacturer.

E. Lap joints in direction of flow.

F. Connect base section to foundation using anchor lugs of size and number recommended by manufacturer.

G. Join sections with acid-resistant joint cement to provide continuous joint and smooth interior finish.

H. Erect stacks plumb to finished tolerance of no more than 1 inch (25 mm) out of plumb from top to bottom.

3.4 INSTALLATION OF UNLISTED, FIELD-FABRICATED CHIMNEYS

A. Suspend chimneys independent of their appliance connections.

B. Install seismic restrains according to manufacturer's written instructions. Comply with requirements in Section 230548 "Vibration and Seismic Controls for HVAC."

C. Lap joints in direction of flow.

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

3.5 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. Provide temporary closures at ends of chimneys and stacks that are not completed or connected to equipment.

END OF SECTION 235133