

SECTION 23 5100
BREECHINGS, CHIMNEYS, AND STACKS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Field fabricated breechings.
- B. Manufactured breechings.
- C. Type B double wall gas vents.
- D. Double wall metal stacks.
- E. Induced draft fans.
- F. Stationary auxiliary power generator engine exhaust piping.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 21 0716 - Fire Suppression Equipment Insulation.
- C. Section 22 0513 - Common Motor Requirements for Plumbing Equipment: Induced draft fan motor.
- D. Section 22 0716 - Plumbing Equipment Insulation.
- E. Section 22 0719 - Plumbing Piping Insulation.
- F. Section 23 0513 - Common Motor Requirements for HVAC Equipment: Induced draft fan motor.
- G. Section 23 0716 - HVAC Equipment Insulation.
- H. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.
- I. Section 26 3213 - Engine Generators: Exhaust silencer.

1.03 REFERENCE STANDARDS

- A. ANSI Z21.66 - American National Standard for Automatic Vent Damper Devices for Use with Gas-Fired Appliances; 1996 (R2006).
- B. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2013.
- C. ASME B16.21 - Nonmetallic Flat Gaskets for Pipe Flanges; 2011.
- D. ASME B31.9 - Building Services Piping; 2014.
- E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- F. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General - Purpose Piping; 2013.
- G. ASTM A193/A193M - Standard Specification for Alloy - Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications; 2014.
- H. ASTM A194/A194M - Standard Specification for Carbon and Alloy Nuts for Bolts for High Pressure or High Temperature Service, or Both; 2015.
- I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
- J. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- K. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

- L. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- M. NFPA 31 - Standard for the Installation of Oil Burning Equipment; 2011.
- N. NFPA 54 - National Fuel Gas Code; 2015.
- O. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- P. NFPA 82 - Standard on Incinerators and Waste and Linen Handling Systems and Equipment; 2014.
- Q. NFPA 211 - Guide for Smoke and Heat Venting; 2013, Including All Amendments.
- R. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.
- S. UL 103 - Factory-Built Chimneys for Residential Type and Building Heating Appliances; Current Edition, Including All Revisions.
- T. UL 378 - Standard for Draft Equipment; Current Edition, Including All Revisions.
- U. UL 441 - Standard for Gas Vents; Current Edition, Including All Revisions.
- V. UL 641 - Type L Low Temperature Venting Systems; Current Edition, Including All Revisions.
- W. UL 959 - Medium Heat Appliance Factory Built Chimneys; Current Edition, Including All Revisions.

1.04 DEFINITIONS

- A. Breeching: Vent Connector.
- B. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.
- C. Smoke Pipe: Round, single wall vent connector.
- D. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.
- E. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

1.05 DESIGN REQUIREMENTS

- A. Factory built vents and chimneys used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.
- B. Design refractory lined metal stacks for wind loading of 110 mph and seismic loads for Zone _____.

1.06 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.07 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations where factory built units are used.
- D. Manufacturer's Instructions: Include installation instructions, and indicate assembly, support details, and connection requirements.
- E. Manufacturer's Certificate: Certify that refractory lined metal stacks meet or exceed specified requirements.

1.08 QUALITY ASSURANCE

- A. Designer Qualifications: Design stacks under direct supervision of a Professional Structural Engineer experienced in design of the type of work specified and licensed in Michigan.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years documented experience, and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. AMPCO by Hart & Cooley, Inc; Model VSI: www.ampcostacks.com.
- B. Metal-Fab, Inc; _____: www.mtlfab.com.
- C. Selkirk Corporation; Model PS: www.selkirkcommercial.com.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 BREECHINGS, CHIMNEYS, AND STACKS - GENERAL REQUIREMENTS

- A. Regulatory Requirements:
 - 1. Conform to applicable code for installation of natural gas burning appliances and equipment.
 - 2. Conform to NFPA 31 for installation of oil burning appliances and equipment.
 - 3. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.03 FIELD FABRICATED BREECHINGS

- A. Breechings Less Than 24 inches in Diameter: Fabricate from hot-dipped galvanized steel sheet, ASTM A653/A653M FS, with G90/Z275 coating; make longitudinal seams using pipe lock or flat lock groove seam and make end joints beaded and crimped.
- B. Minimum Metal Thicknesses based on SMACNA (DCS):
 - 1. Sizes up to 12 inches: 18 gage, 0.0478 inch.
 - 2. Sizes 13 to 24 inches: 16 gage, 0.0598 inch.
- C. Provide adjustable self-actuating barometric draft dampers, where indicated on drawings, full size of breeching.
- D. Provide cleanout doors of same gage as breeching where indicated on drawings.
- E. Reinforcing: Provide angle frames for rectangular breeching and flanged girth joints or angle frames for round breeching in accordance with SMACNA (DCS), at following intervals:
 - 1. Sizes up to 30 inches: No reinforcing required.
- F. Fabricate breeching fittings to match adjoining breechings. Fabricate elbows with center-line radius equal to breeching width. Limit angular tapers to 20 degrees maximum.

2.04 MANUFACTURED BREECHINGS

- A. Provide factory-built, modular connector and manifold system, tested to UL 103 with positive pressure rating.
- B. Assembly to be UL listed for use with building equipment in compliance with NFPA 211.
- C. Fabricate with 1 inch minimum air space between walls and construct inner liner of 304 stainless steel and outer jacket of 304 stainless steel.
 - 1. Protect aluminized steel surfaces exposed to the elements with a minimum of one base coat of primer and one finish coat of corrosion resistant paint suitable for outer jacket skin temperatures of the application.
- D. Design, fabricate, and install gas-tight preventing products of combustion leaking into the building.

1. Securely connect inner joints and seal with factory supplied overlapping V-bands and appropriate sealant in accordance with manufacturer's instructions.
2. System design to compensate for all flue gas induced thermal expansion.

2.05 TYPE B DOUBLE WALL GAS VENTS

- A. Fabrication: Inner pipe of sheet aluminum, and outer pipe of galvanized sheet steel, tested in compliance with UL 441.
- B. Electrically Actuated Vent Dampers: Same size as draft hood collar, constructed of stainless steel or galvanized steel, with corrosion-resistant components, in compliance with ANSI Z21.66.

2.06 DOUBLE WALL METAL STACKS

- A. Provide double wall metal stacks, tested to UL 103 and UL listed with positive pressure rating, for use with building heating equipment, in compliance with NFPA 211.
- B. Fabricate with 1 inch minimum air space between walls and construct inner liner of 304 stainless steel and outer jacket of 304 stainless steel.
 1. Protect aluminized steel surfaces exposed to the elements with a minimum of one base coat of primer and one finish coat of corrosion resistant paint suitable for outer jacket skin temperatures of the application.
- C. Accessories, UL labeled:
 1. Ventilated Roof Thimble: Consists of roof penetration, vent flashing with spacers and storm collar.
 2. Stack Cap: Consists of conical rainshield with inverted cone for partial rain protection with low flow resistance.

2.07 INDUCED DRAFT FANS

- A. Mechanical Draft Induction Type:
 1. Venturi Tube Section Fabrication: Type 304 stainless steel.
 2. Fan: Forward curved venturi type, tested to UL 378, with shaded pole, sleeve bearing motor, refer to Section 22 0513.
- B. Induced Draft Type:
 1. Fabrication: Forward curved fan and scroll of mild steel with direct drive shaded pole motor with ball bearings, internal cooling fan, stainless steel shaft, and internal centrifugal switch, tested to UL 378.
- C. Capacity: _____ cu ft/min standard air at _____ inch negative static pressure, and _____ inch negative static pressure at tight suction shut-off.
- D. Electrical Characteristics:
 1. Motor: Refer to Section 22 0513.
 2. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
 3. Disconnect Switch: Factory mount disconnect switch in control panel.
- E. Control: Refer to Section 26 2717.

2.08 STATIONARY AUXILIARY POWER GENERATOR ENGINE EXHAUST PIPING

- A. Steel Pipe: ASTM A53/A53M, Schedule 40.
 1. Fittings:
 - a. Buttweld conforming to ASTM A234/A234M.
 - b. Wall thickness and material same as adjoining pipe.
 - c. Built-up miter welded fittings are acceptable where miter angles of each individual section do not exceed 22.5 degrees total and not more than 11.25 degrees relative to the axis of the pipe at any one cut.
 2. Flanges:
 - a. Class 150, slip-on, forged steel welding flanges in accordance with ASME B16.5.
 - b. Material in accordance with ASTM A181/A181M, Grade I.
 - c. Provide for connections to engines, exhaust silencers, and flexible connections.

3. Gaskets:
 - a. High temperature asbestos-free material suitable for the service.
 - b. ASME B16.21 composition ring, 0.0625 inch thick.
 4. Bolts: Alloy-steel, conforming to ASTM A193/A193M, Grade B7, and of sufficient strength for full bearing on nuts, projecting not more than two full threads beyond the nut.
 5. Nuts: Alloy-steel, conforming to ASTM A194/A194M, Grade 7.
 6. Provide stainless steel counterbalance type rain caps at exhaust pipe termination points.
- B. Flexible joints:
1. Provide flanged, multiple, corrugated, stainless steel expansion joints with liners, between exhaust manifold and exhaust piping to absorb thermal expansion and vibration.
 2. Suitable for operation at 200 degrees F above normal exhaust gas temperature at 100 percent load, 10,000 cycles minimum.
 3. Design and construct for diesel engine exhaust application.
- C. Hangers and Supports: Provide hangers and supports that comply with MSS SP-58.
- D. Piping Sleeves:
1. Outside Walls Below and Above Grade, Floor, or Roof Slabs: Standard weight zinc coated pipe.
 2. Partitions: Zinc coated sheet steel having nominal weight of not less than 0.90 lb per square foot.
 3. Piping Insulation: Provide insulation in accordance with Section 22 0719.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install breechings with minimum of joints. Align accurately at connections, with internal surfaces smooth.
- C. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breechings, chimneys, and stacks at 12 foot spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA (DCS) for equivalent duct support configuration and size.
- D. Install concrete inserts for support of breechings, chimneys, and stacks in coordination with formwork.
- E. Pitch breechings with positive slope up from fuel-fired equipment to chimney or stack.
- F. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- G. Coordinate installation of dampers, and induced draft fans. Refer to Section 26 2717.
- H. Insulate breechings in accordance with Section 22 0716.
- I. For Type B double wall gas vents, maintain UL listed minimum clearances from combustibles. Assemble pipe and accessories as required for complete installation.
- J. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement. Connect base section to foundation using anchor lugs.
- K. Level and plumb chimney and stacks.
- L. Clean breechings, chimneys, and stacks during installation, removing dust and debris.
- M. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings, breeching insulation, chimneys, or stacks.
- N. Provide maximum 2 feet of breeching to connect appliance to chimney. Provide Type B chimney continuously from appliances.
- O. Engine Exhaust:
 1. Install engine exhaust piping in accordance with MSS SP-58 and ASME B31.9.

2. Install exhaust silencer provided in accordance with Section 26 3213.
3. Provide sleeves with sufficient length to pass through entire thickness of walls, floors, roofs, partitions, or slabs.
4. Extend sleeves in floor slabs 2 inches above finished floor.
5. Firmly pack insulation between pipe and sleeve and caulk both ends with plastic waterproof cement.
6. Space Between Pipe Insulation and Sleeve: Not less than 0.25 inch thick.

END OF SECTION 23 5100