SECTION 233723 - HVAC GRAVITY VENTILATORS

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. Louvered-penthouse ventilators.
2. Roof hoods.
3. Goosenecks.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design ventilators, including comprehensive engineering analysis by a qualified professional engineer, using structural[**and seismic**] performance requirements and design criteria indicated.

B. Structural Performance: Ventilators shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of ventilator components, noise or metal fatigue caused by ventilator blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
2. Wind Loads: Determine loads based on a uniform pressure of [**20 lbf/sq. ft. (960 Pa)**] [**30 lbf/sq. ft. (1440 Pa)**] <**Insert design wind pressure**>, acting inward or outward.
3. Wind Loads: Determine loads based on pressures indicated below:

a. Corner Zone: Within <**Insert distance**> of building corners, uniform pressure of <**Insert design wind pressure**>, acting inward, and <**Insert design wind pressure**>, acting outward.

b. Other Than Corner Zone: Uniform pressure of <**Insert design wind pressure**>, acting inward, and <**Insert design wind pressure**>, acting outward.

C. Seismic Performance: Ventilators, including attachments to other construction, shall withstand the effects of earthquake motions determined according to [**ASCE/SEI 7**] <**Insert requirement**>.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified[**and the unit will be fully operational after the seismic event**]."

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes, without buckling, opening of joints, overstressing of components, failure of connections, or other detrimental effects.

1. Temperature Change (Range): [**120 deg F (67 deg C), ambient; 180 deg F (100 deg C)**] <**Insert temperature range**>, material surfaces.

E. Water Entrainment: Limit water penetration through unit to comply with ASHRAE 62.1.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.[**For louvered-penthouse ventilators specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.**]

B. LEED Submittals:

1. Product Data for Prerequisite IEQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."

C. Shop Drawings: For gravity ventilators. Include plans, elevations, sections, details, ventilator attachments to curbs, and curb attachments to roof structure.

1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.

D. Samples: For each exposed product and for each color and texture specified.

E. Samples for Initial Selection: For units with factory-applied color finishes.

F. Samples for Verification: For each type of louvered-penthouse ventilator indicated, in manufacturer's standard size.

G. Delegated-Design Submittal: For shop-fabricated ventilators indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of shop-fabricated ventilators.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof framing plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members to which roof curbs and ventilators will be attached.
2. Sizes and locations of roof openings.

B. Seismic Qualification Certificates: For ventilators, 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. Welding certificates.

1.6 QUALITY ASSURANCE

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

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.7 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T5 or T-52.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003 or 5005 with temper as required for forming or as otherwise recommended by metal producer for required finish.

C. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 (Z275) zinc coating, mill phosphatized.

D. Stainless-Steel Sheet: ASTM A 666, Type 304, with No. [**4**] [**6**] finish.

E. Fasteners: Same basic metal and alloy as fastened metal or 300 Series stainless steel unless otherwise indicated. Do not use metals that are incompatible with joined materials.

1. Use types and sizes to suit unit installation conditions.
2. Use [**Phillips flat**] [**hex-head or Phillips pan**]-head screws for exposed fasteners unless otherwise indicated.

F. Post-Installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors made from stainless-steel components, with capability to sustain without failure a load equal to 4 times the loads imposed for concrete, or 6 times the load imposed for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 FABRICATION, GENERAL

A. Factory or shop fabricate gravity ventilators to minimize field splicing and assembly. Disassemble units to the minimum extent as necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

B. Fabricate frames, including integral bases, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

C. Fabricate units with closely fitted joints and exposed connections accurately located and secured.

D. Fabricate supports, anchorages, and accessories required for complete assembly.

E. Perform shop welding by AWS-certified procedures and personnel.

2.3 LOUVERED-PENTHOUSE VENTILATORS

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

B. Construction: All-welded assembly with [**4-inch (100-mm)**] [**6-inch (150-mm)**]-deep louvers, mitered corners, and [**aluminum**] [**galvanized-steel**] [**stainless-steel**] sheet roof[**with mineral-fiber insulation and vapor barrier**].

C. Frame and Blade Material and Nominal Thickness: Extruded aluminum, of thickness required to comply with structural performance requirements, but not less than 0.080 inch (2.0 mm) for frames and [**0.080 inch (2.0 mm)**] [**0.060 inch (1.5 mm)**] for blades[**with condensate deflectors**].

1. Blade Spacing: <**Insert inches (mm)**>.
2. Blade Angle: <**Insert number**> degrees.
3. AMCA Seal: Mark units with the AMCA Certified Ratings Seal.
4. Exterior Corners: Prefabricated corner units with [**mitered and welded blades**] [**mitered blades with concealed close-fitting splices**] and with [**fully recessed**] [**semirecessed**] mullions at corners.

D. Frame and Blade Material and Nominal Thickness: Galvanized-steel sheet, of thickness required to comply with structural performance requirements, but not less than 0.052 inch (1.3

mm) for frames and [**0.040 inch (1.0 mm)**] [**0.052 inch (1.3 mm)**] [**0.064 inch (1.6 mm)**] for blades[**with condensate deflectors**].

1. Blade Spacing: <**Insert inches (mm)**>.
2. Blade Angle: <**Insert number**> degrees.
3. AMCA Seal: Mark units with the AMCA Certified Ratings Seal.
4. Exterior Corners: Prefabricated corner units with [**mitered and welded blades**] [**mitered blades with concealed close-fitting splices**] and with [**fully recessed**] [**semirecessed**] mullions at corners.

E. Frame and Blade Material and Nominal Thickness: Stainless-steel sheet, of thickness required to comply with structural performance requirements, but not less than [**0.050 inch (1.27 mm)**] [**0.062 inch (1.57 mm)**], with grain running [**parallel**] [**perpendicular**] to length of blades and frame members[**with condensate deflectors**].

1. Blade Spacing: <**Insert inches (mm)**>.
2. Blade Angle: <**Insert number**> degrees.
3. AMCA Seal: Mark units with the AMCA Certified Ratings Seal.
4. Exterior Corners: Prefabricated corner units with [**mitered and welded blades**] [**mitered blades with concealed close-fitting splices**] and with [**fully recessed**] [**semirecessed**] mullions at corners.

F. Roof Curbs: Galvanized-steel sheet; with mitered and welded corners; 1-1/2-inch- (40-mm-) thick, rigid fiberglass insulation adhered to inside walls; and 1-1/2-inch (40-mm) wood nailer. Size as required to fit roof opening and ventilator base.

1. Configuration: [**Self-flashing without a cant strip, with**] [**Built-in cant and**] [**Built-in raised cant and**] mounting flange.
2. Overall Height: [**8 inches (200 mm)**] [**9-1/2 inches (240 mm)**] [**12 inches (300 mm)**] [**16 inches (400 mm)**] [**18 inches (450 mm)**].

G. Bird Screening: [**Galvanized-steel, 1/2-inch- (12.7-mm-) square mesh, 0.041-inch (1.04-mm) wire**] [**Aluminum, 1/2-inch- (12.7-mm-) square mesh, 0.063-inch (1.6-mm) wire**] [**Flattened, expanded aluminum, 3/4 by 0.050 inch (19 by 1.27 mm) thick**] [**Stainless-steel, 1/2-inch- (12.7-mm-) square mesh, 0.047-inch (1.19-mm) wire**].

H. Insect Screening: [**Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh, 0.012-inch (0.30-mm)**] [**Stainless-steel, 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm)**] wire.

I. Galvanized-Steel Sheet Finish:

1. Surface Preparation: Clean surfaces of dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and repair galvanizing according to ASTM A 780. Apply a conversion coating suited to the organic coating to be applied over it.
2. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply an air-dried primer immediately after cleaning and pretreating.
3. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat and an overall minimum dry film thickness of 2 mils (0.05 mm).

a. Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].

J. Accessories:

1. Dampers:

a. Location: [**Penthouse neck**] [**Inside louver face**].
b. Control: [**Manual**] [**Motorized**].

K. Capacities and Characteristics:

1. Height: <**Insert inches (mm)**>.
2. Width and Depth: <**Insert inches (mm)**> by <**Insert inches (mm)**>.
3. Free Area: Not less than [**5.0 sq. ft. (0.46 sq. m)**] [**6.0 sq. ft. (0.56 sq. m)**] [**7.0 sq. ft. (0.65 sq. m)**] <**Insert free area**> for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
4. Air Performance: Not more than [**0.10-inch wg (25-Pa)**] <**Insert pressure**> static pressure drop at [**600-fpm (3.0-m/s)**] [**700-fpm (3.6-m/s)**] [**800-fpm (4.1-m/s)**] <**Insert velocity**> free-area [**exhaust**] [**intake**] velocity.
5. Wind-Driven Rain Performance: Not less than [**99**] [**95**] [**80**] <**Insert number**> percent effectiveness when subjected to a rainfall rate of [**3 inches (75 mm) per hour and a wind speed of 29 mph (13 m/s)**] [**8 inches (200 mm) per hour and a wind speed of 50 mph (22.4 m/s)**] at a core-area intake velocity of [**300 fpm (1.5 m/s)**] [**400 fpm (2.0 m/s)**] [**500 fpm (2.5 m/s)**] <**Insert velocity**>.

2.4 ROOF HOODS

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

B. Factory or shop fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figures 6-6 and 6-7.

C. Materials: [**Galvanized-steel sheet, minimum 0.064-inch- (1.62-mm-) thick base and 0.040-inch- (1.0-mm-) thick hood**] [**Aluminum sheet, minimum 0.063-inch- (1.6-mm-) thick base and 0.050-inch- (1.27-mm-) thick hood**]; suitably reinforced.

D. Roof Curbs: Galvanized-steel sheet; with mitered and welded corners; 1-1/2-inch- (40-mm-) thick, rigid fiberglass insulation adhered to inside walls; and 1-1/2-inch (40-mm) wood nailer. Size as required to fit roof opening and ventilator base.

1. Configuration: [**Self-flashing without a cant strip, with**] [**Built-in cant and**] [**Built-in raised cant and**] mounting flange.
2. Overall Height: [**8 inches (200 mm)**] [**9-1/2 inches (240 mm)**] [**12 inches (300 mm)**] [**16 inches (400 mm)**] [**18 inches (450 mm)**].

E. Bird Screening: [**Galvanized-steel, 1/2-inch- (12.7-mm-) square mesh, 0.041-inch (1.04-mm) wire**] [**Aluminum, 1/2-inch- (12.7-mm-) square mesh, 0.063-inch (1.6-mm) wire**] [**Flattened, expanded aluminum, 3/4 by 0.050 inch (19 by 1.27 mm) thick**] [**Stainless-steel, 1/2-inch- (12.7-mm-) square mesh, 0.047-inch (1.19-mm) wire**].

F. Insect Screening: [**Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh, 0.012-inch (0.30-mm)**] [**Stainless-steel, 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm)**] wire.

G. Galvanized-Steel Sheet Finish:

1. Surface Preparation: Clean surfaces of dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and repair galvanizing according to ASTM A 780. Apply a conversion coating suited to the organic coating to be applied over it.
2. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply an air-dried primer immediately after cleaning and pretreating.
3. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat and an overall minimum dry film thickness of 2 mils (0.05 mm).

a. Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].

H. Capacities and Characteristics:

1. Height: <**Insert inches (mm)**>.
2. Width and Depth: <**Insert inches (mm)**> by <**Insert inches (mm)**>.
3. Free Area: Not less than [**5.0 sq. ft. (0.46 sq. m)**] [**6.0 sq. ft. (0.56 sq. m)**] [**7.0 sq. ft. (0.65 sq. m)**] <**Insert free area**> for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
4. Air Performance: Not more than [**0.10-inch wg (25-Pa)**] <**Insert pressure**> static pressure drop at [**600-fpm (3.0-m/s)**] [**700-fpm (3.6-m/s)**] [**800-fpm (4.1-m/s)**] <**Insert velocity**> free-area [**exhaust**] [**intake**] velocity.

2.5 GOOSENECKS

A. Factory or shop fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 6-5; with a minimum of 0.052-inch- (1.3-mm-) thick, galvanized-steel sheet.

B. Roof Curbs: Galvanized-steel sheet; with mitered and welded corners; 1-1/2-inch- (40-mm-) thick, rigid fiberglass insulation adhered to inside walls; and 1-1/2-inch (40-mm) wood nailer. Size as required to fit roof opening and ventilator base.

1. Configuration: [**Self-flashing without a cant strip, with**] [**Built-in cant and**] [**Built-in raised cant and**] mounting flange.
2. Overall Height: [**8 inches (200 mm)**] [**9-1/2 inches (240 mm)**] [**12 inches (300 mm)**] [**16 inches (400 mm)**] [**18 inches (450 mm)**].

C. Bird Screening: [**Galvanized-steel, 1/2-inch- (12.7-mm-) square mesh, 0.041-inch (1.04-mm) wire**] [**Aluminum, 1/2-inch- (12.7-mm-) square mesh, 0.063-inch (1.6-mm) wire**] [**Flattened, expanded aluminum, 3/4 by 0.050 inch (19 by 1.27 mm) thick**] [**Stainless-steel, 1/2-inch- (12.7-mm-) square mesh, 0.047-inch (1.19-mm) wire**].

D. Insect Screening: [**Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh, 0.012-inch (0.30-mm)**] [**Stainless-steel, 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm)**] wire.

E. Galvanized-Steel Sheet Finish:

1. Surface Preparation: Clean surfaces of dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and repair galvanizing according to ASTM A 780. Apply a conversion coating suited to the organic coating to be applied over it.
2. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply an air-dried primer immediately after cleaning and pretreating.
3. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat and an overall minimum dry film thickness of 2 mils (0.05 mm).

a. Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].

F. Capacities and Characteristics:

1. Height: <**Insert inches (mm)**>.
2. Width and Depth: <**Insert inches (mm)**> by <**Insert inches (mm)**>.
3. Free Area: Not less than [**5.0 sq. ft. (0.46 sq. m)**] [**6.0 sq. ft. (0.56 sq. m)**] [**7.0 sq. ft. (0.65 sq. m)**] <**Insert free area**> for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
4. Air Performance: Not more than [**0.10-inch wg (25-Pa)**] <**Insert pressure**> static pressure drop at [**600-fpm (3.0-m/s)**] [**700-fpm (3.6-m/s)**] [**800-fpm (4.1-m/s)**] <**Insert velocity**> free-area [**exhaust**] [**intake**] velocity.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install gravity ventilators level, plumb, and at indicated alignment with adjacent work.

B. Install goosenecks on curb base where throat size exceeds [**9 by 9 inches (230 by 230 mm)**] <**Insert measurement**>.

C. Install gravity ventilators with clearances for service and maintenance.

D. Install perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Install concealed gaskets, flashings, joint fillers, and insulation as installation progresses. Comply with Section 079200 "Joint Sealants" for sealants applied during installation.

F. Label gravity ventilators according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

G. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

H. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

3.2 CONNECTIONS

A. Duct installation and connection requirements are specified in Section 233113 "Metal Ducts" and Section 233116 "Nonmetal Ducts." Drawings indicate general arrangement of ducts and duct accessories.

3.3 ADJUSTING

A. Adjust damper linkages for proper damper operation.

END OF SECTION 233723