



#### 3.4 OPERATION AND MAINTENANCE

-- End of Section Table of Contents --



specification when you choose to reconcile  
references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-02-GUIDE (2004) Guide to the Use of the Wind Load  
Provisions of ASCE 7-02

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING  
ENGINEERS (ASHRAE)

ASHRAE-03 (1997) Handbook, Fundamentals (IP Edition)

ASHRAE-04 (1997) Handbook, Fundamentals (SI Edition)

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M (2002) Standard Specification for Zinc  
(Hot-Dip Galvanized) Coatings on Iron and  
Steel Products

ASTM B 209/B 209M (2004) Standard Specification for Aluminum  
and Aluminum-Alloy Sheet and Plate

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS FF-B-171 (Rev A; Am 1) Bearings, Ball, Annular  
(General Purpose)

FS FF-B-185 (Am 4) Bearings, Roller, Cylindrical; and  
Bearings, Roller, Self and Aligning

1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions  
in Section 01330 SUBMITTAL PROCEDURES and edit the  
following list to reflect only the submittals  
required for the project. Submittals should be kept  
to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the  
submittal requires Government approval. Some  
submittals are already marked with a "G". Only  
delete an existing "G" if the submittal item is not  
complex and can be reviewed through the Contractor's  
Quality Control system. Only add a "G" if the  
submittal is sufficiently important or complex in  
context of the project.

For submittals requiring Government approval on Army  
projects, a code of up to three characters within  
the submittal tags may be used following the "G"  
designation to indicate the approving authority.

Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

#### SD-01 Preconstruction Submittals

Material, Equipment, and Fixture Lists shall be submitted in accordance with paragraph entitled, "General Requirements," of this section.

#### SD-02 Shop Drawings

Fabrication Drawings shall be submitted for gravity roof ventilator systems in accordance with paragraph entitled, "Design and Fabrication Requirements," of this section.

Installation Drawings shall be submitted for gravity roof ventilator systems in accordance with the paragraph entitled, "Installation," of this section. Drawings shall indicate overall physical features, dimensions, ratings, service requirements, and equipment weights.

#### SD-03 Product Data

Equipment and Performance Data shall be submitted for gravity roof ventilator systems in accordance with paragraph entitled, "Design and Fabrication Requirements," of this section.

Manufacturer's catalog data shall be submitted for the following items:

- Ventilators
- Bases
- Curbs
- Dampers
- Screens

#### SD-04 Samples

Manufacturer's Standard Color Chart shall be submitted in accordance with paragraph entitled, "Design and Fabrication Requirements," of this section.

## SD-06 Test Reports

Test reports shall be submitted for leakage tests in accordance with the paragraph entitled, "Tests," of this section.

## SD-07 Certificates

Listing of Product Installations shall be submitted for gravity roof ventilator systems in accordance with paragraph entitled, "Installation," of this section.

Certificates shall be submitted for following items showing conformance with the referenced standards contained in this section.

Ventilators  
Bases  
Curbs  
Dampers  
Screens

## SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals shall be submitted in accordance with paragraph entitled, "Operation and Maintenance," of this section.

### 1.3 GENERAL REQUIREMENTS

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**NOTE: If Section 15003S GENERAL MECHANICAL PROVISIONS," is not included in the project specification, applicable requirements therefrom should be inserted and the following paragraph deleted. If Section 15072S VIBRATION ISOLATION FOR AIR CONDITIONING EQUIPMENT is not included in the project specification, applicable requirements therefrom should be inserted and the second paragraph deleted.**  
\*\*\*\*\*

[Section 15003S GENERAL MECHANICAL PROVISIONS applies to work specified in this section.]

[Section 15072S VIBRATION ISOLATION FOR AIR CONDITIONING EQUIPMENT applies to work specified in this section.]

Material, Equipment, and Fixture Lists shall be submitted including manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site.

## PART 2 PRODUCTS

### 2.1 DESIGN AND FABRICATION REQUIREMENTS

\*\*\*\*\*  
**NOTE: Edit to retain the features required.**  
\*\*\*\*\*

Roof ventilators shall be of the sizes indicated and shall be furnished complete with bases, curbs, flashing flanges, dampers and damper controls, louvers, and screens.

Equipment and Performance Data shall be submitted for gravity roof ventilator systems consisting of use life, system functional flows, safety features, and mechanical automated details. Curves indicating tested and certified equipment responses and performance characteristics shall also be submitted.

Fabrication Drawings shall be submitted for gravity roof ventilator systems consisting of fabrication and assembly details to be performed in the factory.

Manufacturer's Standard Color Chart shall indicate the manufacturer's standard color selections and finishes for gravity roof ventilators.

#### 2.1.1.1 Design

Ventilators shall be weatherproof and shall be free from backdraft except for interior negative pressure. Ventilators shall be self-cleaning by the action of the elements, with provision for carrying water and normal wind-transported matter to the outside.

\*\*\*\*\*  
**NOTE: Retain only the types required.**  
\*\*\*\*\*

Turbine and oscillating-head ventilators shall rotate automatically with any change in wind direction without binding and shall be accurately balanced with permanently lubricated bearings designed to ensure quiet operation. Bearings shall be bronze or corrosion-resistant steel conforming to FS FF-B-171 for ball bearings and to FS FF-B-185 for roller bearings of type, class and grade required.

\*\*\*\*\*  
**NOTE: Modify windloading requirements as required.**  
\*\*\*\*\*

Ventilators shall be designed for windloads in accordance with ASCE 7-02-GUIDE, and in no case shall the installed design be for less than 130 kilometer 80 miles per hour windload. Structural bracing shall be properly spaced to accommodate this loading and in accordance with the design requirements of the covering material.

\*\*\*\*\*  
**NOTE: Retain the following paragraph only if ridge type ventilators are required.**  
\*\*\*\*\*

Ridge type ventilators shall be equipped with wind jump diaphragms spaced at each structural frame to afford efficient ventilation regardless of wind direction.

#### 2.1.1.2 Fabrication

Ventilators shall be reinforced and braced with properly formed joints. Edges shall be wired or beaded, where necessary, to ensure rigidity.

Galvanic action between dissimilar metals shall be prevented by nonconductive separators. Soldering shall be even and smooth.

\*\*\*\*\*  
**NOTE: Retain the following paragraph only if  
protected metal is required.**  
\*\*\*\*\*

Bolts, rivets, and other fastenings used in connection with protected metal shall be corrosion-resistant steel.

\*\*\*\*\*  
**NOTE: Retain the following paragraph only if ridge  
ventilators are required.**  
\*\*\*\*\*

Ridge ventilators shall be constructed in sections suitable for shipment and installation. Joints between sections shall be waterproof and shall allow for expansion and contraction. Suitable end fittings shall be provided for each continuous run of ventilator.

## 2.2 VENTILATOR TYPE

Ventilator framing shall be the same material as the hood or a compatible material.

\*\*\*\*\*  
**NOTE: Retain only required types. Drawings must  
indicate each required type.**  
\*\*\*\*\*

### 2.2.1 Round, Industrial, Stationary

Type RIS-GRV ventilator shall be round, industrial appearance, low-profile, metal, stationary, gravity ventilator, mounted on square-to-round base designed to match roof slope and roof panel configuration. Ventilators shall be fabricated of sheet metal with rib-reinforced metal throat, baffle ring and circular wind band, a reinforced cone-shaped rain cap, and solid sheet metal vertical bracing. Edges shall be beaded and reinforced.

### 2.2.2 Square, Stationary

Type SS-GRV ventilator shall be a square or rectangular, metal, high-capacity, low-profile, stationary, gravity ventilator, of modular size and shall be not more than 560 millimeter 22 inches higher than the roof curb. Ventilators shall be a formed plate, overlap baffle design with a minimum of 40-percent net opening through the throat.

### 2.2.3 Heat Valve Stationary

Type HVS-GRV ventilator shall be a continuous heat-valve type industrial monitor ridge ventilator. Each ventilator shall be furnished in standard 3000 millimeter 10-foot sections with throat size indicated, complete with side baffles, ventilator assembly, hardware, end caps, splice plates, flashing, reinforcing diaphragms, closures, and fasteners. Ventilators shall be reinforced and braced. Diaphragms shall be not more than 915 millimeter 3 feet on center, flanged at contact points, and riveted or welded in place. Side baffles shall have integral rain-drip slots, not more than 400 millimeter 16 inches on center.



#### 2.2.4 Round, Commercial, Stationary

Type RCS-GRV ventilator shall be round, commercial or institutional appearance, low-profile, stationary, gravity ventilator. Hood shall be free of exposed seams, joints, and fasteners, except for hinge fasteners.

#### 2.2.5 Square, Commercial, Stationary

Type SCS-GRV ventilator shall be square or rectangular, commercial or institutional appearance, low-profile, stationary, gravity ventilator. Hood shall be free of exposed seams, joints, and fasteners, except that metal hoods may have hairline joints at ends and edge reinforcing angles may have exposed fasteners.

#### 2.2.6 Rotating Head

Type RH-GRV ventilator shall be rotating-head gravity ventilator mounted on a square-to-round metal base designed to match roof slope and roof panel configuration.

Ventilator shall have an outlet opening of approximately the same size as the throat opening.

Ventilator hood shall rotate on sealed, permanently lubricated antifriction thrust bearings. Hood assembly shall be formed of sheet metal properly reinforced and braced for the design windload. Hood shall incorporate an effective metal wind vane.

#### 2.2.7 Turbine-Head

Type TH-GRV ventilator shall be turbine-head gravity ventilator mounted on a square-to-round metal base designed to match roof slope and roof panel configuration.

Rotor head shall be spherical in configuration with reinforced-edge airfoil-shaped rotor blades. Rotor shaft shall be carried by a factory sealed antifriction thrust bearings at one end and by a bronze, self-lubricated sleeve bearing at the other end. Rotor shaft and bearing assembly shall be housed in a sealed and lubricant-packed aluminum casting.

### 2.3 CAPACITY RATING

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**NOTE: Modify the following conditions to suit the  
project requirements.**  
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Capacity ratings indicated shall be in accordance with ASHRAE-04 ASHRAE-03 for the combined effects of 8 kilometer per hour 5 mph minimum winds, exterior-interior temperature differential of minus 12 degrees C 10 degrees F, and stack height indicated.

### 2.4 MATERIALS

Materials shall be manufacturer's standard materials and shall conform to the requirements specified herein. Metals shall be of temper best suited for forming and intended use.

\*\*\*\*\*  
NOTE: Delete inapplicable materials. If more than  
one material is required, indicate location of  
various materials on the drawings.  
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#### 2.4.1 Aluminum Alloy

Aluminum alloy shall conform to ASTM B 209/B 209M.

#### 2.4.2 Zinc-Coated Steel

Zinc-coated steel shall conform to ASTM A 123/A 123M, Class C.

#### 2.4.3 Fibrous Glass

Fibrous glass ventilators shall be molded from a glass-fiber reinforced polyester resin with a pigmented polyester resin gel coat in manufacturer's standard color, and shall be not less than 0.508 or more than 1.52 millimeter 20 or more than 60 mils thick. Matrix material shall have not less than 30 percent, by weight, of chopped-fiber and random-strand glass fibers and shall be thoroughly saturated and impregnated with not more than 70 percent high-solids and polyester resin with not less than 5 percent antimony trioxide fire-retardant additive. Material shall be smooth, dense, and uniform in texture, color, and cross section and shall be shatter-resistant, rigid, and free from visual defects, foreign inclusions, cracks, crazing, die lines, pinholes, striations, unsaturated and resin-poor areas, and excessive-resin areas.

#### 2.5 BASES

Bases provided with the ventilators shall be factory formed, of the type indicated, shall be the same material as the hoods, and the thickness necessary to meet the design requirements specified herein. Bases shall be provided with flashing. Flanges shall extend a sufficient distance over the adjoining roof surfaces to provide for proper connection with the roof. Bases shall be suitable for raised curb mounting where indicated. Curb flanges of the base shall be formed as cap flashing extending at least 100 millimeter 4 inches over roofing base. Where indicated or required, shafts of ventilators shall be extended a sufficient distance through the supporting construction to permit attachment of vent ducts.

#### 2.6 ROOF CURBS

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NOTE: Select the type of roof ventilator curb  
required on the project.  
\*\*\*\*\*

[Factory-formed metal ventilator curbs shall be of type and design required for the ventilator and suitable for roof configuration and flashing.]

[Job-built curbs shall conform to the recommendations of the ventilator manufacturer, be sized correctly for the ventilator, and shall be suitable for type of supporting roof construction.]

#### 2.7 DAMPERS

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**NOTE: Retain only the options required for the project.**

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Dampers shall be constructed of [the same materials as the ventilators]  
[translucent fiberglass-reinforced plastic to provide for daylight.]

Dampers shall be provided with chains or cables, locking devices, and required hardware for satisfactory operation. Dampers shall be a type that will completely close the opening or that may be set securely at any desired position. Dampers for ridge ventilators shall be manually or motor operated, either individually or in groups, as indicated. Dampers shall be designed to open automatically in case of fire by means of mechanical linkage and 100 degrees C 212-degree F fusible links.

## 2.8 SCREENS

[Bird] [Insect] screens shall be provided with frames of the same material as that used in the ventilators and shall be securely attached in a manner that will permit easy removal for access and cleaning.

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**NOTE: Retain the following paragraph only if ridge ventilators are required.**

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Screens for ridge ventilators shall be in sections to match ventilator sections with cross members of frames flanged for bolted connection.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Ventilators, ventilator bases, and prefabricated curbs shall be installed in accordance with manufacturer's instructions, the approved shop drawings, and as indicated.

Installation of ventilators shall be coordinated with other work. Anchors, attachments, and other items to be built shall be coordinated for installation as the work progresses. Ventilators shall be rigidly installed in a weathertight and watertight manner and shall be free from vibration. Following installation, operating devices shall be adjusted for proper operation.

Installation Drawings shall be submitted for gravity roof ventilator systems. Drawings shall indicate overall physical features, dimensions, ratings, service requirements, and equipment weights.

Listing of Product Installations shall be submitted for gravity roof ventilator systems showing a minimum of 5 installed units, similar to those proposed for use, that have been in successful service for a minimum period of 5 years. List shall include purchaser, address of installation, service organization, and date of installation.

### 3.2 TESTS

Ventilators shall be tested for leakage in the presence of the Contracting Officer. Ventilators shall not leak when tested as follows:

Each unit shall be subjected to spot leak tests with a water hose held at a distance of not more than 3000 millimeter 10 feet and adjusted for a spray impact of approximately 350 kilopascal 50 pounds per square inch at not less than 2.0 liter 5 gallons per minute.

### 3.3 LUBRICATION

Movable parts of dampers and related operating hardware shall be lubricated in accordance with manufacturer's printed instructions and shall operate smoothly and quietly without binding.

### 3.4 OPERATION AND MAINTENANCE

Contractor shall submit [6] [\_\_\_\_\_] copies of the Operation and Maintenance Manuals 30 calendar days prior to testing the gravity roof ventilator systems. Data shall be updated and resubmitted for final approval no later than 30 calendar days prior to contract completion.

-- End of Section --