

**SECTION 23 37 00  
AIR OUTLETS AND INLETS**

SPEC WRITER NOTES:

1. Delete between //-- --// if not applicable to project. Also delete any other item or paragraph not applicable in the Section and renumber the paragraphs.
2. Provide the year of latest edition to each publication given in paragraph APPLICABLE PUBLICATIONS.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. A complete listing of common acronyms and abbreviations are included in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
- B. Air Outlets and Inlets: Diffusers, registers, and grilles.

**1.2 RELATED WORK**

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- C. Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- D. //Section 08 90 00, LOUVERS and VENTS.//
- E. //Section 11 53 13, LABORATORY FUME HOODS.//
- F. //Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.//
- G. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
- H. Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.
- I. Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC.
- J. //Section 23 38 13, COMMERCIAL-KITCHEN HOODS.//

**1.3 APPLICABLE PUBLICATIONS**

SPEC WRITER NOTES:

1. Make material requirements agree with requirements specified in the referenced Applicable Publications. Verify and update the publication list to that which applies to the project unless the reference applies to all HVAC systems. Publications that apply to all HVAC systems may not be specifically referenced in the body of the specification but shall form a part of this specification.
2. Insert the year of approved latest edition of the publications between the brackets // // and delete the

brackets if applicable to this project.

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Where conflicts occur these specifications and the VHA standards will govern.
- B. Air Duct Council:  
Flexible Duct Performance & Installation Standards (Manual), 5<sup>th</sup> Edition  
Green Book
- C. American Society of Civil Engineers (ASCE):  
7-//2016//.....Minimum Design Loads and Associated Criteria  
for Buildings and Other Structures
- D. American Society for Testing and Materials (ASTM):  
B209/B209M-//2021//.....Standard Specification for Aluminum and  
Aluminum-Alloy Sheet and Plate
- E. National Fire Protection Association (NFPA):  
90A-//2021//.....Standard for the Installation of  
Air-Conditioning and Ventilating Systems
- F. Underwriters Laboratories, Inc. (UL):  
181-//2013 (R2017)//.....Standard for Factory-Made Air Ducts and Air  
Connectors

#### **1.4 SUBMITTALS**

- A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 23 XX XX, SECTION TITLE", with applicable paragraph identification.
- C. Manufacturer's Literature and Data Including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.
  - 1. Air intake/exhaust hoods.
  - 2. Diffusers, registers, grilles, and accessories.

SPEC WRITER NOTE: O&M Manuals shall be submitted for content review as part of closeout documents.

- D. Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replaceable parts, and troubleshooting guide:
1. Include complete list indicating all components of the systems.
  2. Include complete diagrams of the internal wiring for each item of equipment.
  3. Diagrams shall have their terminals identified to facilitate installation, operation, and maintenance.

#### **1.5 QUALITY ASSURANCE**

- A. Fire Safety Code: Comply with NFPA 90A.
- B. Bio-Based Materials: For products designated by the USDA's Bio-Preferred Program, provide products that meet or exceed USDA recommendations for bio-based content, so long as products meet all performance requirements in this specifications section. For more information regarding the product categories covered by the Bio-Preferred Program, visit <http://www.biopreferred.gov>.
- C. Refer to Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for additional sustainable design requirements.

#### **1.6 AS-BUILT DOCUMENTATION**

- A. Comply with requirements in paragraph AS-BUILT DOCUMENTATION of Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

### **PART 2 - PRODUCTS**

#### **2.1 GRAVITY INTAKE/EXHAUST VENTILATORS (ROOF MOUNTED)**

- A. Aluminum, ASTM B209/B209M, louvered, spun, or fabricated using panel sections with roll-formed edges, 13 mm (1/2 inch) mesh aluminum welded wire bird screen, with gravity or motorized dampers where shown, accessible interior, designed for wind velocity specified in paragraph Intake/Exhaust Hoods Exposed to Wind Velocity in this section.
1. Spun Intake/Exhaust Ventilators: Spun aluminum structural components shall be constructed of minimum 1.6 mm (16 Gauge) marine alloy aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. The spun aluminum baffle shall have a rolled bead for added strength.
  2. Louvered Intake/Exhaust Hoods: Louvered hood constructed from 0.081 mm (0.003 inch) extruded aluminum tiers welded to a minimum 4.3 mm (8 Gauge) aluminum support structure. The aluminum hood shall be constructed of a minimum 0.064 mm (0.025 inch) marine alloy aluminum

and provided with a layer of anti-condensate coating. The aluminum base shall have continuously welded curb cap corners for maximum leak protection.

3. Low Silhouette Intake/Exhaust Ventilator: The unit shall be of bolted and welded construction utilizing corrosion resistant fasteners. The aluminum hood shall be constructed of minimum 1.9 mm (14 Gauge) marine alloy aluminum, bolted to a minimum 4.3 mm (8 Gauge) aluminum support structure. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. Birdscreen constructed of 13 mm (1/2 inch) mesh shall be mounted across the relief opening.
- B. See ventilator schedule on the contract drawings. Sizes shown on the contract drawings designate throat size. Area of ventilator perimeter opening shall be not less than the throat area.
- C. Dampers for Gravity Ventilators without Duct Connection: Construct damper of the same material as the ventilator and of the design to completely close opening or remain wide open. Hold damper in closed position by a brass chain and catch. Extend chains 305 mm (12 inches) below and engage catch when damper is closed.
- D. //See paragraph Intake/Exhaust Hoods Exposed to Wind Velocity in this section for exposure to high wind velocities.//
- E. Provide roof curb by unit manufacturer. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC for additional requirements.

## 2.2 EQUIPMENT SUPPORTS

Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

SPEC WRITER NOTE: Edit or delete  
distribution plate to suit project.

## 2.3 AIR OUTLETS AND INLETS

- A. Materials:
  1. Steel or aluminum //except that all supply air outlets installed in operating rooms and Cystoscopy rooms shall be stainless-steel (see paragraph Operating Room Air Distribution Devices in this section). Use aluminum air outlets and inlets for facilities located in high-humidity areas. Exhaust air registers located in combination toilets and shower stalls shall be constructed from aluminum.//. Provide manufacturer's standard gasket.
  2. Exposed Fastenings: The same material as the respective inlet or outlet. Fasteners for aluminum may be stainless-steel.

3. Contractor shall review all ceiling drawings and details and provide all ceiling mounted devices with appropriate dimensions and trim for the specific locations.
- B. Performance Test Data: In accordance with Air Duct Council "Flexible Duct Performance & Installation Standards (Manual), Green Book". Refer to Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT for NC criteria.
- C. Air Supply Outlets:
1. Ceiling Diffusers: Suitable for surface mounting, exposed T-bar or special tile ceilings, off-white finish, square or round neck connection as shown on the contract drawings. Provide plaster frame for units in plaster ceilings.
    - a. Square, Louver, Fully Adjustable Pattern: Round neck, surface mounting unless shown otherwise on the contract drawings. Provide equalizing or control grid and volume control damper.
    - b. Louver Face Type: Square or rectangular, removable core for 1, 2, 3, or 4 way directional pattern. Provide equalizing or control grid and opposed blade damper.
    - c. Perforated Face Type: Manual adjustment for one-, two-, three-, or four-way horizontal air distribution pattern without change of air volume or pressure. Provide equalizing or control grid and opposed blade over overlapping blade damper. Perforated face diffusers for VAV systems shall have the pattern controller on the inner face, rather than in the neck and designed to discharge air horizontally at the ceiling maintaining a Coanda effect.
 

SPEC WRITER NOTE: Make sure slot diffuser boots are insulated externally in addition to factory installed lined insulation to match the duct insulation.
    - d. Slot diffuser/plenum:
      - 1) Diffuser: Frame and support bars shall be constructed of heavy gauge extruded aluminum. Form slots or use adjustable pattern controllers, to provide stable, horizontal air flow pattern over a wide range of operating conditions.
      - 2) Galvanized steel boot lined with 13 mm (1/2 inch) thick fiberglass conforming to NFPA 90A and complying with UL 181 for erosion. The internal lining shall be factory-fabricated, anti-microbial, and non-friable.

- 3) Provide inlet connection diameter equal to duct diameter shown on the contract drawings or provide transition coupling if necessary. Inlet duct and plenum size shall be as recommended by the manufacturer.
  - 4) Maximum pressure drop at design flow rate: 37 Pa (0.15 inch WG)
- e. HEPA Filter Laminar Flow Diffuser:
1. Ceiling Diffusers: Suitable for surface mounting, exposed T-bar or special tile ceilings, off-white finish, square or round neck connection as shown on the contract drawings. Provide plaster frame for units in plaster ceilings.
  2. Refer to Section 23 40 00, HVAC AIR CLEANING DEVICES for HEPA filter information.
- f. //Linear Bar Grilles and Diffusers: Extruded aluminum, manufacturer's standard finish, and positive holding concealed fasteners.
1. Margin Frame: Flat, 19 mm (3/4 inch) wide.
  2. Bars: Minimum 5 mm (3/16 inch) wide by 19 mm (3/4 inch) deep, zero deflection unless otherwise shown. Bar spacing shall be a minimum of 3.2 mm (1/8 inch) on center. Reinforce bars on 457 mm (18 inch) center for sidewall units and on 152 mm (6 inch) center for units installed in floor or sills.
  3. Provide opposed blade damper and equalizing or control grid where shown//.
2. //Operating Room Air Distribution Devices:
- a. Devices shall consist of a non-aspirating perforated panel center air supply providing downward airflow over the operating table and fixed nonadjustable multiple slot perimeter panels surrounding the operating table area to provide an air curtain which shall be projected outward from the operating table area at not less than a five degree angle nor greater than a 15 degree angle. Velocity of air distribution at operating table height shall not exceed 12 m/min (40 fpm) for the center supply or 15 m/min (50 fpm) for the air curtain. Perforated pressure plates shall be provided over the perimeter and center air distribution faces to equalize pressure and airflow throughout the system.
  - b. All components of the system inside the operating room shall be fabricated of 0.95 mm (20 Gauge) thick 18-8 stainless-steel,

No. 4 finish, and outside the operating room shall be of the manufacturer's standard aluminum finish. All distribution components and pressure plates shall be attached to the face panels at both the perimeter and center. The face panels shall be retained with 1/4 turn fasteners. Plenums shall be supplied by the manufacturer and shall be sized to permit them to be easily wiped out by hand with germicidal solution for sterilization purposes and all horizontal corners of the plenums shall have a minimum radius of 19 mm (3/4 inch). Connecting elbows shall be radialized and be sized to permit manual sterilization of the plenums.//

3. Supply Registers: Double deflection type with horizontal face bars and opposed blade damper with removable key operator.
  - a. Margin: Flat, 32 mm (1-1/4 inches) wide.
  - b. Bar Spacing: 19 mm (3/4 inch) maximum.
  - c. Finish: Off white baked enamel for ceiling mounted units. Wall units shall have a prime coat for field painting or shall be extruded with manufacturer's standard finish.

4. Supply Grilles: Same as registers but without the opposed blade damper.

SPEC WRITER NOTE: Drum Louvers are typically provided in high bay/Long throw applications.

5. Drum Louvers: Aluminum construction, drum louver, with pivoted blades and rotating drum to adjust length of throw and direction.
  - a. Register shall have integral, face adjustable, opposed blade damper constructed of heavy gauge steel. Damper shall be operable from the face of the register. Units shall be nozzle type with adjustable discharge pattern.

SPEC WRITER NOTE: Designed for medium throw with low air volumes.

6. Jet Diffusers: Aluminum construction (nozzle and frame) suitable for wall or ceiling mounting or direct mounting on ducts.

- D. Return and Exhaust Registers and Grilles: Provide opposed blade damper without removable key operator for registers.

SPEC WRITER NOTES:

1. Oversize grilles to reduce static pressure drop.

2. Grilles shall be selected in standard sizes (i.e., 12 inch by 12 inch or 24 inch by 24 inch).
1. Finish: Off-white baked enamel for ceiling mounted units. Wall units shall have a prime coat for field painting or shall be extruded aluminum with manufacturer's standard aluminum finish.
  2. Standard Type: Fixed horizontal face bars set at 30 to 45 degrees, approximately 32 mm (1-1/4 inch) margin.
  3. Perforated Face Type: To match supply units.
  4. Grid Core Type: 13 mm by 13 mm (1/2 inch by 1/2 inch) core with 32 mm (1-1/4 inch) margin.
  5. Linear Type: To match supply units.
  6. Door Grilles: Are furnished with the doors.
  7. Egg Crate Grilles: Aluminum or Painted Steel 13 mm by 13 mm by 13 mm (1/2 inch by 1/2 inch by 1/2) inch grid providing 90 percent free area.
    - a. Heavy extruded aluminum frame shall have countersunk screw mounting. Unless otherwise indicated, register blades and frame shall have factory applied white finish.
    - b. Grille shall be suitable for duct or surface mounting as indicated on the contract drawings. All necessary appurtenances shall be provided to allow for mounting.
- E. Supply Registers in Psychiatric Rooms: Supply air registers shall be security type, steel with perforated faceplate, flat surface margin, extension sleeve, opposed blade damper and back mounting flanges. Faceplate shall be 5 mm (3/16 inch) minimum with 5 mm by 5 mm holes on 7 mm (3/16 inch by 3/16 inch holes on 9/32 inch) spacing and a minimum free area of 45 percent. Wall sleeve shall be 5 mm (3/16 inch) thick (minimum).
- F. Air Inlet Registers in Psychiatric Rooms: Return, exhaust, transfer, and relief air registers shall be security type, steel with perforated faceplate, flat surface margin, wall sleeve, opposed blade damper and back mounting flanges. Faceplate shall be 5 mm (3/16 inch) minimum with 5 mm by 5 mm holes on 7 mm (3/16 inch by 3/16 inch holes on 9/32 inch) spacing and a minimum free area of 45 percent. Wall sleeve shall be 5 mm (3/16 inch) thick minimum.
- G. Acoustic Transfer Grille: Aluminum, suitable for partition or wall mounting.

**2.4 WIRE MESH GRILLE**

- A. Fabricate grille with 2 by 2 inch mesh 13 mm (1/2 inch) galvanized steel or aluminum hardware cloth in a spot welded galvanized steel frame with approximately 38 mm (1-1/2 inch) margin.
- B. Use grilles where shown in unfinished areas such as mechanical rooms.

**2.5 FILTER RETURN/EXHAUST GRILLE**

- A. Provide grille within stream 25 mm (1 inch) deep MERV 4 filter and removable face.
  - 1. Finish: Off-white baked enamel for ceiling mounted units. Wall units shall have a prime coat for field painting or shall be extruded aluminum with manufacturer's standard aluminum finish. Stainless-steel shall be No. 4 finish.
  - 2. Standard Type: Fixed horizontal face bars set at 30 to 45 degrees, approximately 32 mm (1-1/4 inch) margin.
  - 3. Steel, aluminum, or stainless-steel as scheduled.
  - 4. Standard face connected to a mounting frame with space for a throwaway filter. Hold face closed by a locking screw. Provide retaining clips to hold filter in place. Provide fiberglass throwaway filter.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. If an installation is unsatisfactory to the COR, the contractor shall correct the installation at no additional cost or time to the Government.
- B. Comply with provisions of Section 23 05 11, COMMON WORK RESULTS FOR HVAC, particularly regarding coordination with other trades and work in existing buildings.
- C. Protection and Cleaning: Protect equipment and materials against physical damage. Place equipment in first class operating condition or return to source of supply for repair or replacement, as determined by COR. Protect equipment during construction against entry of foreign matter to the inside and clean both inside and outside before operation and painting.

**SPEC WRITER NOTE:**

Specify wind velocity per ASCE 7 where wind velocity exceeds 90 mph and hurricane areas.

**3.2 //INTAKE/EXHAUST HOODS EXPOSED TO WIND VELOCITY**

A. Provide additional support and bracing to all exposed ductwork installed on the roof or outside the building to withstand wind velocity of 145 km/h (90 mph) //or, in coastal areas.//

**3.3 TESTING, ADJUSTING, AND BALANCING (TAB)**

A. Refer to Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC.

**3.4 STARTUP AND TESTING**

- A. Perform tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.
- B. When any defects are detected, correct defects and repeat test at no additional cost or time to the Government.

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