

SECTION 234133 - HIGH-EFFICIENCY PARTICULATE FILTRATION

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. HEPA rigid-cell box filters.
 - 2. HEPA V-bank cell filters.
 - 3. HEPA filter diffusers.
 - 4. HEPA filter fan modules.
 - 5. ULPA filters.
 - 6. 95 percent DOP filters.
 - 7. Front- and rear-access filter frames.
 - 8. Side-service housings.
 - 9. Filter gages.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include dimensions; operating characteristics; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.
- B. Shop Drawings: For air filters. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show filter rack assembly, dimensions, materials, and methods of assembly of components.
 - 2. Include setting drawings, templates, and requirements for installing anchor bolts and anchorages.
 - 3. Wiring Diagrams: For power, signal, and control wiring.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended use.
- B. ASHRAE Compliance:

1. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
- C. Comply with IEST-RP-CC001.3.
- D. Comply with UL 586.
- E. Comply with IEST-RP-CC007.1.
- F. Comply with NFPA 90A and NFPA 90B.

PART 2 - PRODUCTS

2.1 HEPA RIGID-CELL BOX FILTERS

- A. Description: Factory-fabricated, disposable, packaged air filters with media perpendicular to airflow and with holding frames.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Camfil Farr Co.
 - b. Grainger
- B. Filter Unit Class: UL 900, Class 1 or Class 2 as required by system.
- C. Media: Fibrous material, constructed so individual pleats are maintained under rated-airflow conditions.
- D. Filter-Media Frames:
 1. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
 2. Materials: Fabricated aluminum or Galvanized sheet.
 3. Style: Double-turned flange.
- E. Mounting Frames: Welded galvanized steel with gaskets and fasteners; suitable for bolting together into built-up filter banks.

2.2 HEPA V-BANK CELL FILTERS

- A. Description: Factory-fabricated, disposable, packaged air filters with media at an angle to airflow and with holding frames.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Camfil Farr Co.
- B. Filter Unit Class: UL 900, Class 1 or Class 2 as required by system.

- C. Media: Fibrous material, constructed so individual pleats are maintained under rated-airflow conditions.
- D. Filter-Media Frames:
 - 1. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
 - 2. Materials: Fabricated aluminumGalvanized sheet.
 - 3. Style: Double-turned flange.
- E. Mounting Frames: Welded galvanized steel with gaskets and fasteners; suitable for bolting together into built-up filter banks.

2.3 HEPA FILTER DIFFUSERS

- A. Description: Factory-fabricated, individually ducted, HEPA filter-holding ceiling modules.
 - 1. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 - a. Camfil Farr Co.
 - b. Grainger
- B. Media: Fibrous glass, constructed of continuous sheets with closely spaced pleats with glass filament separators.
 - 1. Media to Module Side Bond: Urethane sealant.
 - 2. Media to Frame Side Bond: [Polyurethane foam] [Silicone] [Neoprene adhesive] [Fiberglass-mat packing] [Thermosetting sealant] [Knife edge in fluid-filled channel].
 - 3. Application: [Class 100] [Class 10] [Class 1] <Insert class> clean room.
- C. Casing:
 - 1. Configuration: [Ducted inlet] [Plenum inlet] [Plenum inlet with prefilter].
 - 2. Module Material: Extruded aluminum, 16 gage with mill finish.
 - 3. Suspension: Ceiling grid.
- D. Accessories:
 - 1. Diffusion damper.
 - 2. Diffusion-damper adjustment port.
 - 3. Filter test port.

2.4 FRONT- AND REAR-ACCESS FILTER FRAMES

- A. Framing System: Aluminum framing members with access for either upstream (front) or downstream (rear) filter servicing, cut to size and prepunched for assembly into modules. Vertically support filters to prevent deflection of horizontal members without interfering with either filter installation or operation.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Camfil Farr Co.
 - b. Grainger
- B. Prefilters: Incorporate a separate track, removable from front or back.
- C. Sealing: Factory-installed, positive-sealing device for each row of filters to ensure seal between gasketed filter elements to prevent bypass of unfiltered air.
- D. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

2.5 SIDE-SERVICE HOUSINGS

- A. Description: Factory-assembled, side-service housings, constructed of 0.064-inch- thick, galvanized steel, stainless steel or double-wall casing with 1-inch insulation to hold filters. Side servicing is through gasketed access doors on one side, and housings are capable of connection to other housings. Equip housings with metal slide channel tracks with clamping mechanisms to hold filters, and the following:
 - 1. Pressure tap and fitting.
 - 2. Decontamination ports.
 - 3. Isolation dampers.
 - 4. Lifting lugs.
 - 5. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Camfil Farr Co.
 - b. Grainger
- B. Prefilters: Integral tracks to accommodate 2-, 4-, and 6-inch- thick, disposable filters.
- C. Access Doors: Continuous gaskets on perimeter and positive-locking swivel devices. Provide ribbed bagging rim behind access door and PVC bags for bag-in, bag-out arrangement. Arrange so filter cartridges can be loaded from an access door for each tier and section of the following:
 - 1. Combination prefilter and HEPA filter.
 - 2. Prefilter.
 - 3. HEPA filter.
 - 4. Upstream and downstream test section.
- D. Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames to prevent bypass of unfiltered air.

E. Accessories:

1. Filter change-out trays.
2. Document-storage pocket.
3. Filter removal rod.

F. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

2.6 FILTER GAGES

A. Diaphragm type with dial and pointer in metal case, vent valves, black figures on white background, and front recalibration adjustment.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Airguard.
 - b. Dwyer Instruments, Inc.
2. Diameter: 4-1/2 inches.
3. Scale Range for Filter Media Having a Recommended Final Resistance of 0.5-Inch wg or Less: 0- to 0.5-inch wg.
4. Scale Range for Filter Media Having a Recommended Final Resistance of 0.5- to 1.0-Inch wg or Less: 0- to 1.0-inch wg.
5. Scale Range for Filter Media Having a Recommended Final Resistance of 1.0- to 2.0-Inch wg or Less: 0- to 2.0-inch wg .
6. Scale Range for Filter Media Having a Recommended Final Resistance of 2.0- to 3.0-Inch wg or Less: 0- to 3.0-inch wg.
7. Scale Range for Filter Media Having a Recommended Final Resistance of 3.0- to 4.0-Inch wg or Less: 0- to 4.0-inch wg.

B. Manometer-Type Filter Gage: Molded plastic, with epoxy-coated aluminum scale, logarithmic-curve tube gage with integral leveling gage; graduated to read from **0- to 3.0-inch wg** and accurate within 3 percent of full-scale range.

C. Accessories: Static-pressure tips, tubing, gage connections, and mounting bracket.

2.7 CAPACITIES AND CHARACTERISTICS (Engineer of record to edit according to job specifics)

- A. Face Area: **<Insert sq. ft.>**.
- B. Depth: **<Insert inches>**.
- C. Surface Area: **<Insert sq. ft.>**.
- D. Module Size: **<Insert size>**.

- E. Number of Filters/Modules: <Insert number>.
- F. Frame Access Location: <Insert location>.
- G. System Airflow: <Insert cfm>.
- H. Maximum or Rated Face Velocity: <Insert fpm>.
- I. Initial Resistance: <Insert inches wg>.
- J. Recommended Final Resistance: <Insert inches wg>.
- K. Performance Level: HEPA

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Position each filter unit with clearance for normal service and maintenance. Anchor filter holding frames to substrate.
- B. Install filters in position to prevent passage of unfiltered air.
- C. Install filter gage for each filter bank.
- D. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters that were used during construction and testing with new, clean filters.
- E. Install filter-gage static-pressure taps upstream and downstream from filters. Install filter gages on filter banks with separate static-pressure taps upstream and downstream from filters. Mount filter gages on outside of filter housing or filter plenum in an accessible position. Adjust and level inclined gages.
- F. Coordinate filter installations with duct and air-handling unit installations.

3.2 CLEANING

- A. After completing system installation and testing, adjusting, and balancing air-handling and air-distribution systems, clean filter housings and install new filter media.

END OF SECTION 234133