

SECTION 23 4114 - FILTERS

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. Pleated panel filters.
  2. Non-supported bag filters.
  3. Front- and rear-access filter frames.
  4. Electronic air cleaners.
  5. Side-service housings.
  6. Filter gages.

1.3 ACTION 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. [LEED Submittals:**

1. ***Product Data for Prerequisite IEQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."***
2. ***Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.***
3. ***Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."]***

- C. 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. Include diagram for power, signal, and control wiring if applicable.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of filter and rack to include in emergency, operation, and maintenance manuals.
- B. Northwestern University Maintenance Requirement Forms, see Division 01.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Provide three complete set(s) of pre-filters for each pre-filter bank, one set for use during construction, one set for building turnover to University, and one spare set.
  2. Provide two complete set(s) of after and final filters for each after and final filter bank, one set for building turnover to University, and one spare set.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. ASHRAE Compliance:
1. Comply with applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality"; Section 5 - "Systems and Equipment"; and Section 7 - "Construction and Startup."
  2. Comply with ASHRAE 52.2 for MERV for methods of testing and rating air-filter units.
- B. Comply with NFPA 90A and NFPA 90B.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PLEATED PANEL FILTERS

- A. Description: Factory-fabricated, self-supported, extended-surface, pleated, panel-type, disposable air filters with holding frames, **MERV 7, 4" thick**.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AAF International.
    - b. Camfil Farr.
    - c. Flanders Corporation.
- B. Filter Unit Class: UL 900, Class 1 or Class 2.

- C. Media: Interlaced glass or synthetic fibers coated with nonflammable adhesive.
  - 1. Adhesive: As recommended by air-filter manufacturer and with a VOC content of 80 g/L or less.
  - 2. Media shall be coated with an antimicrobial agent.
  - 3. Separators shall be bonded to the media to maintain pleat configuration.
  - 4. Welded-wire grid shall be on downstream side to maintain pleat.
  - 5. Media shall be bonded to frame to prevent air bypass.
  - 6. Support members on upstream and downstream sides to maintain pleat spacing.
- D. Filter-Media Frame: Cardboard frame with perforated metal retainer sealed or bonded to the media.
- E. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
- F. See schedule on drawing for performance information.

### 2.3 NON-SUPPORTED BAG FILTERS

- A. Description: Factory-fabricated, dry, extended-surface, non-supported filters with header frames, **MERV 13 or 14** as required for particular application on the project.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AAF International.
    - b. Camfil Farr.
    - c. Flanders Corporation.
- B. Filter Unit Class: UL 900, Class 1 or Class 2.
- C. Media: [**Glass-fiber**] [**Synthetic**] material constructed so individual pockets are maintained in tapered form under rated-airflow conditions by flexible internal supports.
  - 1. Media shall be coated with an antimicrobial agent.
- D. Filter-Media Frame: [**Galvanized steel**] [**Hard polyurethane foam**].
- E. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
- F. See schedule on drawing for performance information.

### 2.4 FRONT AND REAR ACCESS FILTER FRAMES

- A. Framing System: Galvanized-steel (minimum 16 gage) framing members with access for either upstream (front) or downstream (rear) filter servicing, cut to size and pre-punched 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 one of the following:

- a. AAF International.
- b. Camfil Farr.
- c. Flanders Corporation.

- B. Pre-filters: Incorporate a separate track with spring clips, removable from front [**or back**].
- C. Access Doors: Hinged, with continuous gaskets on perimeter and positive-locking cam or lever type devices, and arranged so filter cartridges can be loaded from either side and access door.
- D. Sealing: Factory-installed, positive-sealing device for each row of filters, to ensure seal between gasketed filter elements and to prevent bypass of unfiltered air.

## 2.5 ELECTRONIC AIR CLEANERS

- A. Description: Factory-fabricated electronic air cleaner operating by electrostatic precipitation principles.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Dynamic Air Quality Solutions.
    - b. Trion, Inc.
    - c. Flanders Corporation.
- B. Collection Cells: Aluminum, independently supported and nested.
  1. Ionizing Section: Alternately spaced grounded struts and charged ionizing wires.
  2. Collecting Section: Alternately grounded and charged plates, with insulators located out of airstream.
- C. Power Pack: Self-contained, prewired rectifying unit to convert 24-V ac, single-phase, 60-Hz power to approximately 9,500-V dc; include overload protection, on-off switch, pilot light showing operating status, and access door interlock.
- D. Safety Accessories: Manual-reset safety switches and warning lights for filter plenum access doors, signal lights and safety switching upstream and downstream from unit within duct, and enameled high-voltage warning signs.
- E. Controls: Programmable logic controller in remotely mounted NEMA 250, Type 12 enclosure; with integral time clock and manual override.
  1. Contacts for enable-disable control by building automation system.
- F. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

## 2.6 SIDE-SERVICE HOUSINGS

- A. Description: Factory-assembled, side-service housings, constructed of [**galvanized steel**] [**aluminum**], with flanges to connect to duct or casing system.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. AAF International.
  - b. Camfil Farr.
  - c. Flanders Corporation.
- B. Pre-filters: Integral tracks to accommodate project depth disposable filters.
- C. Access Doors: Hinged, with continuous gaskets on perimeter and positive-locking cam or lever type devices, and arranged so filter cartridges can be loaded from either side and access door.
- D. Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames and to prevent bypass of unfiltered air.

## 2.7 FILTER GAGES

- A. Diaphragm-type gage 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. Dwyer Instruments, Inc.
  2. Diameter: 4-1/2 inches (115 mm).
  3. Scale Range for Filter Media Having a Recommended Final Resistance of 0.5-Inch wg (125 Pa) or Less: 0- to 0.5-inch wg (0 to 125 Pa).
  4. Scale Range for Filter Media Having a Recommended Final Resistance of 0.5- to 1.0-Inch wg (125 to 250 Pa) or Less: 0- to 1.0-inch wg (0 to 250 Pa).
  5. Scale Range for Filter Media Having a Recommended Final Resistance of 1.0- to 2.0-Inch wg (250 to 500 Pa) or Less: 0- to 2.0-inch wg (0 to 500 Pa).
  6. Scale Range for Filter Media Having a Recommended Final Resistance of 2.0- to 3.0-Inch wg (500 to 750 Pa) or Less: 0- to 3.0-inch wg (0 to 750 Pa).
  7. Scale Range for Filter Media Having a Recommended Final Resistance of 3.0- to 4.0-Inch wg (750 to 1000 Pa) or Less: 0- to 4.0-inch wg (0 to 1000 Pa).
- B. Accessories: Static-pressure tips, tubing, gage connections, and mounting bracket.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Equipment Mounting:
1. ***Install filter assemblies on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in [Section 033000 "Cast-in-Place Concrete."] [Section 033053 "Miscellaneous Cast-in-Place Concrete."]***
  2. Comply with requirements for vibration isolation devices specified in Section 23 0550 "Vibration Isolation."
- B. Position each filter unit with clearance for normal service and maintenance. Anchor filter holding frames to substrate.

- C. Install filters in position to prevent passage of unfiltered air.
- D. Install filter gage for each filter bank.
- E. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing with new, clean filters.
- F. 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.
- G. Coordinate filter installations with duct and air-handling-unit installations.

### 3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections:
  - 1. Test for leakage of unfiltered air while system is operating.
- D. Air filter will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

### 3.3 CLEANING

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

**END OF SECTION 23 4114**