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SECTION 234100 - PARTICULATE AIR 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. Pleated panel filters.
 - 2. Self-supported pocket filters.
 - 3. Front- and rear-access filter frames.
 - 4. Side-service housings.
 - 5. 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. LEED Submittals:

See "LEED Rating System" Article in the Evaluations for discussion on LEED-NC prerequisites and credits.

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

Retain subparagraph below if low-emitting materials are required for LEED-NC Credit EQ 4.1; coordinate with requirements selected in Part 2 for adhesives and sealants.

- 2. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.

- 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.

Retain subparagraph below if equipment includes wiring.

- 3. Wiring Diagrams: For power, signal, and control wiring.
- D. Operation and Maintenance Data: For each type of filter and rack to include in emergency, operation, and maintenance manuals.

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 location and application.
- B. ASHRAE Compliance:

LEED-NC Prerequisite EQ 1 requires compliance with requirements in ASHRAE 62.1. Besides establishing minimum ventilation rates, ASHRAE 62.1 includes requirements for surfaces in contact with the airstream, particulate and gaseous filtration, and equipment access. See "LEED Rating System" Article in the Evaluations for discussion on this prerequisite. Verify with manufacturers the availability of units with components and features that comply with these requirements.

- 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.
- C. Comply with NFPA 90A and NFPA 90B.

1.5 COORDINATION

Retain paragraph below if supporting filter housings in concrete bases.

- A. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.

1.6 EXTRA MATERIALS

- 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 one complete set(s) of filters for each filter bank.

PART 2 - PRODUCTS

Plated panel filters shall be used as pre-filters for all pocket filters in the AHUs. Refer to the ASHRAE Handbook – HVAC Systems and Equipment for application guidelines.

2.1 PLEATED PANEL FILTERS

- A. Description: Factory-fabricated, self-supported, extended-surface, pleated, panel-type, disposable air filters with holding frames.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. AAF International.
 - b. Airguard.
 - c. Camfil Farr.
 - d. Flanders-Precisionaire.
- B. Filter Unit Class: UL 900, Class 2.
- C. Media: Cotton and synthetic fibers coated with nonflammable adhesive.

Retain first subparagraph below if low-emitting materials are required for LEED-NC Credit EQ 4.1.

1. Adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 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 with metal grid on outlet side and steel rod grid on inlet side, hinged, with pull and retaining handles 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. Characteristics:
1. Face Dimensions: 24 x 24 inches or 12 x 24 inches.
 2. Thickness or Depth: 2 inches (50 mm).
 3. Maximum or Rated Face Velocity: 500 fpm.
 4. Composite Average Efficiency, %: $35 \leq E3 \leq 50$.
 5. Average Arrestance, %: N/A
 6. Initial Resistance: 0.30-inch wg (74 Pa) at 500 fpm (2.5 m/s).
 7. Recommended Final Resistance: 1 inches wg.

LEED-NC Prerequisite EQ 1 requires compliance with ASHRAE 62.1, which requires a MERV rating of 6 or higher. For air delivered to occupied spaces, LEED-NC Credit EQ 3.1 requires that filters have a minimum MERV 13 rating.

8. MERV Rating: 6 when tested according to ASHRAE 52.2.

2.2 SELF-SUPPORTED POCKET FILTERS

- A. Description: Factory-fabricated, panel-type, disposable air filters with contoured media for extended surface.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fiberbond Corp.; Multi-Wedge.
- B. Filter Unit Class: UL 900, Class 1.
- C. Media: Non-carcinogenic, non-shedding synthetic fiber, bonded with a flame retardant binder system.
 1. Media shall be coated with an antimicrobial agent.
- D. Configuration: Multipocket.
- E. Filter-Media Frame: Galvanized steel.
- F. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
- G. Capacities and Characteristics:
 1. Face Dimensions: 24 x 24, 24 x 12 or 12 x 24 inches.
 2. Maximum or Rated Face Velocity: 500 fpm.
 3. Average Arrestance, %: N/A.
 4. Initial Resistance: 0.5 inches wg (Pa).
 5. Recommended Final Resistance: 1.0 inches wg (Pa).

LEED-NC Prerequisite EQ 1 requires compliance with ASHRAE 62.1, which requires a MERV rating of 6 or higher. For air delivered to occupied spaces, LEED-NC Credit EQ 3.1 requires that filters have a minimum MERV 13 rating. Follow Application Guidelines in ASHRAE 52.2 for MERV rating, but no less than MERV 11.

6. MERV Rating: [11] [12] [13] <Insert number> when tested according to ASHRAE 52.2.

2.3 FRONT- AND REAR-ACCESS FILTER FRAMES

- A. Framing System: Galvanized-steel 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 one of the following:
 - a. AAF International.
 - b. Airguard.
 - c. Camfil Farr.
 - d. Flanders-Precisionaire.
 - e. Koch Filter Corporation.
- B. Prefilters: Incorporate a separate track with spring clips, removable from front.
- C. 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.

2.4 SIDE-SERVICE HOUSINGS

- A. Description: Factory-assembled, side-service housings, constructed of galvanized steel 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. Airguard.
 - c. Camfil Farr.
 - d. Flanders-Precisionaire.
 - e. Koch Filter Corporation.
 - B. Prefilters: Integral tracks to accommodate 2-inch- (50-mm-) deep, disposable filters.
 - C. Access Doors: Hinged, with continuous gaskets on perimeter and positive-locking devices, and arranged so filter cartridges can be loaded from either 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.

2.5 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.

- b. Magnehelic.
 - 2. Diameter: 4-1/2 inches (115 mm).
 - 3. 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).
- B. Accessories: Static-pressure tips, tubing, gage connections, and mounting bracket.

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. The gauge shall be mounted on the air handler, near the filter bank, in a convenient location for reading from the floor.

LEED-NC Credit EQ 3.1 requires that filters have a minimum MERV 13 rating for air delivered to occupied spaces. Air-handling units should not be used for temporary heating and ventilating unless expressly approved by Owner. If used during construction, see SMACNA's "IAQ Guidelines for Occupied Buildings under Construction" for procedures to protect HVAC system.

- D. 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.
- 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.
- G. Provide brass tag, mounted near filter gauge, indicating size, flow rate, initial and final pressure drops, efficiency and fire classification for each type of filter.

3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Test for leakage of unfiltered air while system is operating.
- C. Air filter will be considered defective if it does not pass tests and inspections.

- D. 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 234100