SECTION 234133 - HIGH-EFFICIENCY PARTICULATE AIR FILTRATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. HEPA rigid-cell box filters.
2. Side-access HEPA/ULPA filter housings.
3. HEPA filter gauges.

B. Related Requirements:

1. Section 234100 "Particulate Air Filtration" for particulate-air filters used in combination with HEPA filters.

1.2 DEFINITIONS

A. DOP: Dioctyl phthalate.

B. HEPA: High-efficiency particulate air.

C. PAO: Poly-alpha-olefin.

D. PSL: Polystyrene latex.

E. ULPA: Ultralow penetration air.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. 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.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Show filter rack assembly, dimensions, materials, and methods of assembly of components.
3. Include setting drawings, templates, and requirements for installing anchor bolts and anchorages.

1.4 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates, for filters, accessories, and components from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Product Test Reports: For each filter, for tests performed by a qualified testing agency.

C. 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.

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 one complete set(s) of filters for each filter bank. If system includes prefilters, provide only prefilters.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: An NRTL.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in a clean, dry place.

B. Comply with manufacturer's written rigging and installation instructions for unloading and moving to final installed location.

C. Handle products carefully to prevent damage, breaking, denting, and scoring. Do not install damaged products.

D. Protect products from weather, dirt, dust, water, construction debris, and physical damage.

1. Retain factory-applied coverings on equipment to protect finishes during construction and remove just prior to operating unit.

2. Cover unit openings before installation to prevent dirt and dust from entering inside of units. If required to remover coverings during unit installation, reapply coverings over openings after unit installation and remove just prior to operating unit.
3. Replace installed products damaged during construction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Filters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Component Importance Factor: 1.5.

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

C. Comply with UL 900.

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

E. Capacities and Characteristics: See Mechanical Schedules sheet.

2.2 HEPA RIGID-CELL BOX FILTERS

A. Manufacturers: CAMFIL or approved equal.

B. Source Limitations: Obtain from single source from single manufacturer.

C. Description: Factory-fabricated, disposable, packaged air filters with media perpendicular to airflow and with holding frames.

D. Standards:

1. Comply with IEST-RP-CC001.6.
2. Comply with UL 586.
3. Comply with IEST-RP-CC034.4.

E. Media: Fibrous material, constructed so individual pleats are maintained under rated-airflow conditions.

1. Internal Separators: Corrugated aluminum.
2. Media to Filter Frame Seal Material: Polyurethane.
3. Faceguard Material: Aluminum or Stainless steel.
4. Faceguard Location: Upstream.

F. Filter-Media Frames:

1. Material: Galvanized steel

G. Description: Factory-fabricated ULPA filters with holding casing.

H. Standards:

1. Comply with IEST-RP-CC001.6.
2. Comply with UL 586.
3. Comply with IEST-RP-CC007.3.
4. Comply with IEST-RP-CC034.4.

2.3 SIDE-ACCESS HEPA/ULPA FILTER HOUSINGS

A. CAMFIL or approved equal.

B. Source Limitations: Obtain from single source from single manufacturer.

C. Description: Factory-assembled, side-access filter housings, specifically designed for HEPA/ULPA/95 percent DOP filter banks, with flanges to connect to duct or casing system.

D. Factory Testing: Factory pressure test housing and sealed joints at 6.0-inch wg. Document and submit to confirm maximum manufacturer recommended leakage.

E. Materials: Galvanized steel double-wall casing

1. Pressure taps and fittings.
2. DOP test ports.
3. Mounted magnehelic gauges.

F. Prefilters: Integral tracks to accommodate scheduled prefilter on mechanical schedules sheet.

G. Access Doors: Hinged, with continuous gaskets on perimeter and positive-locking devices. Arranged for filter access from both-sides access door.

H. Gasketed Sealing: Factory-installed, positive-sealing device for each filter to ensure seal between gasketed filter elements to prevent bypass of unfiltered air. Filter latching mechanism to seat each filter firmly against side-access housing channel surface.

I. Knife-Edge Sealing: Knife-edge to mate with HEPA filter elements to prevent bypass of unfiltered air. Factory-installed, positive-locking mechanism for each filter to seat the knife edge into the gel during installation and to remove the filter from the knife edge during filter replacement.

2.4 HEPA FILTER GAUGES

A. Source Limitations: Obtain from single source from single manufacturer.

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

1. Diameter: 2-1/2 inches
2. Material: Stainless-steel case and die-cast aluminum or stainless-steel body with wetted material matching body material
3. Accuracy: Plus/minus 2 percent of full scale.
4. 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.
5. 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.

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine ducts, air-handling units, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF FILTERS

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. 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.

D. Coordinate filter installations with duct and air-handling unit installations.

3.3 INSTALLATION OF HEPA, ULPA, AND 95 PERCENT DOP FILTER GAUGES

A. Install filter gauge for each filter bank.

B. Install filter-gauge, static-pressure tips upstream and downstream from filters. Install filter gauges on filter banks with separate static-pressure taps upstream and downstream from filters. Mount filter gauges on outside of filter housing or filter plenum in an accessible position. Adjust and level inclined gauges.

3.4 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring between pressure sensors and DDC system.

C. Connect control wiring between controlled devices.

D. Connect control wiring according to Section 260523 "Control-Voltage Electrical Power Cables."

3.5 FIELD QUALITY CONTROL

A. Testing Agency:

1. Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. HEPA and ULPA Filters: Pressurize housing to a minimum of 6.0-inch wg, and test housing joints, door seals, and sealing edges of filter for air leaks according to pressure-decay method in ASME AG-1.

C. Air filter will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.6 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.

3.7 PROTECTION

A. Protect installed products and accessories from damage during construction.

END OF SECTION 234133