

SECTION 15860

AIR CLEANING DEVICES

**PART 1 –GENERAL**

1.1 SUMMARY

- A. Section includes activated carbon filters, automatic renewable media filters, disposable, extended area panel filters, disposable panel filters, electronic air cleaners, extended surface high efficiency media filters, extended surface nonsupported media filters, extended surface retained media filters, high efficiency particulate air (HEPA) filters, washable permanent panel filters, filter frames, filter gages.

1.2 REFERENCES

- A. ARI 850 (Air-Conditioning and Refrigeration Institute) - Commercial and Industrial Air Filter Equipment.
- B. ASHRAE 52 (American Society of Heating, Refrigerating and Air Conditioning Engineers) - Method of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter.
- C. MIL-STD-282 - Filter Units, Protective Clothing, Gas-Mask Components, and related Products: Performance-Test Methods.
- D. UL 586 (Underwriters Laboratories, Inc.) - Test Performance of High Efficiency Particulate, Air Filter Units.
- E. UL 867 (Underwriters Laboratories, Inc.) - Electrostatic Air Cleaners.
- F. UL 900 (Underwriters Laboratories, Inc.) - Test Performance of Air Filter Units.

1.3 PERFORMANCE REQUIREMENTS

- A. Conform to ARI 850 Section 7.4.
- B. Dust Spot Efficiency: Plus or minus 5 percent.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.

- B. Shop Drawings: Indicate filter assembly and filter frames, dimensions, motor locations, and electrical characteristics and connection requirements.
- C. Product Data: Submit data on filter media, filter performance data, filter assembly and filter frames, dimensions, motor locations and electrical characteristics and connection requirements.
- D. Manufacturer's Installation Instructions: Submit assembly and change-out procedures.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01770 - Execution Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit instructions for operation, changing, and periodic cleaning.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.7 PRE-INSTALLATION MEETING

- A. Section 01330 - Administrative Requirements: Pre-installation meeting.

1.8 WARRANTY

- A. Section 01770 - Execution Requirements: Product warranties and product bonds.

1.9 EXTRA MATERIALS

- A. Section 01770 - Execution Requirements: Spare parts and maintenance products.
- B. Provide an extra set of filters.

## PART 2 –PRODUCTS

### 2.1 ACTIVATED CARBON FILTERS

- A. Provide materials in accordance with applicable codes and laws as well as the Stanford University Facilities Design Guidelines and all Stanford University Contract documents.
- B. Assembly: Galvanized steel unit incorporating extruded aluminum tracks to accommodate filter servicing trays in deep V arrangement arranged for upstream, downstream, or side servicing with disposable panel pre-filter.
  - 1. Nominal Size: 24 x 24 x 29 inches.
- C. Media: Activated Carbon Density: 34 lb./cu ft, pellets or granular to 6 x 10 Tyler mesh screen.
  - 1. Carbon Tetrachloride Activity: Minimum 60 percent; in thin bed.
  - 2. Trays: Nominal size 24 x 24 x 5/8 inches thick.
  - 3. Carbon: 1.42 cu ft per 1000-cfm nominal airflow capacity.
- D. Rating: 500 fpm face velocity, 0.45 inch wg resistance.

### 2.2 AUTOMATIC RENEWABLE MEDIA FILTERS

- A. Assembly: Galvanized steel assembly with drive, controls, and media, which feeds media across air stream and winds and compresses used media for disposal. Enclose the clean media roll with hinged roll cover. Include tension panel to compress used media as it is spooled. Arrange to allow upstream replacement of filter media.
- B. Media: UL 900 Class 2, rolled and compressed, graduated density glass fiber blanket, nominally 2 inch thick when expanded, 65 feet long; factory sprayed with flameproof, non-drip, non-volatile adhesive; bonded reinforcing on leaving side of media to prevent stretching and necking.
- C. Performance Rating, ASHRAE 52:
  - 1. Dust Spot Efficiency: 25 percent.
  - 2. Weight Arrestance: Minimum 80 percent.
  - 3. Face Velocity: 500 fpm.
  - 4. Initial Resistance at Pressure: 0.17 inch wg.
  - 5. Recommended Final Resistance: 0.50 inch wg.
- D. Controls: Factory wired control package to advance when filter resistance exceeds selected high limit, with media run out switch to stop travel and indicate run out, and manual switch to override controls and advance media.

- E. Frame: Auxiliary frame on downstream side of unit for side access to extended surface retained media, non-supported media, biological or HEPA filters.

### 2.3 DISPOSABLE, EXTENDED AREA PANEL FILTERS

- A. Media: UL 900 Class 1, pleated, fine, glass fiber laminated to synthetic backing; supported and bonded to welded wire grid by corrugated aluminum separators.
  - 1. Frame: Cardboard
  - 2. Nominal size: Design dependent
  - 3. Nominal thickness: Design dependent
- B. Rating, ASHRAE 52:
  - 1. Dust spot efficiency: 95 percent.
  - 2. Weight arrestance: 99 percent.
  - 3. Initial resistance at 500 fpm face velocity
  - 4. Recommended final resistance: Design dependent

### 2.4 DISPOSABLE PANEL FILTERS

- A. Media: UL 900 Class 2, fiber blanket, factory sprayed with flameproof, non-drip, nonvolatile adhesive.
  - 1. Nominal Size: Design dependent
  - 2. Thickness: 2 inch
- B. Performance Rating:
  - 1. Face Velocity: 500 fpm
  - 2. Initial Resistance: 0.10 inch wg
  - 3. Recommended Final Resistance: 0.50 inches wg.
- C. Casing: Cardboard-frame with perforated metal retainer.
- D. Holding Frames: 20 gage minimum galvanized steel frame with expanded metal grid on outlet side and steel rod grid on inlet side, hinged with pull and retaining handles.

### 2.5 ELECTRONIC AIR CLEANERS

- A. Assembly: UL 867; galvanized steel assembly containing electronic agglomerator and disposable panel automatic renewable media or extended surface nonsupported media filters.
- B. Electronic Agglomerator: Independently supported and nested collection cells of aluminum construction including ionizing section consisting of alternately spaced grounded struts and charged ionizing wires, and collecting section consisting of alternately grounded and charged plates, with insulators located out of air stream.

- C. Power Pack: Self-contained, pre-wired rectifying unit to convert 120 volts, single phase, 60 Hz AC power to approximately 12,000 volts DC for ionizer and 6,000 volts DC for collector, including overload protection, on-off switch, pilot light indicating operating status.
- D. Safety Accessories: Manual reset safety switches and warning lights for filter plenum access doors, signal lights and safety switching upstream and downstream of unit within duct, and enamel high voltage warning signs.

## 2.6 EXTENDED SURFACE HIGH EFFICIENCY MEDIA FILTERS

- A. Media: Pleated, water-resistant glass fiber with aluminum or Kraft separators; in 16 gage steel holding frame with corrosion resistant coating.
  - 1. Nominal Size: Design dependent.
- B. Performance Rating, ASHRAE 52:
  - 1. Dust Spot Efficiency: 95 percent.
  - 2. MIL-STD-282 Test 0.3 Micron Dioctyl Phthalate Smoke (DOP) Efficiency: 99 percent.
  - 3. Initial Resistance at 150 fpm. Face Velocity: 0.35 inch wg.
  - 4. Recommended Final Resistance: 2.0 inch wg.

## 2.7 EXTENDED SURFACE NON-SUPPORTED MEDIA FILTERS

- A. Media: UL 900 Class 1 reinforced glass fiber performed into series of pockets with media spacing controls by variable length stitches; galvanized steel header frame.
  - 1. Media Area: 35 sq ft of media per 1000 capacity.
  - 2. Nominal size: 24 x 24 inches face, 22, 30 or 36 inches deep.
- B. Performance Rating, ASHRAE 52:
  - 1. Percent Dust Spot Efficiency: 95 percent.
  - 2. Percent Weight Arrestance: 99 percent.
  - 3. Initial Resistance: 0.30 inch wg
  - 4. Recommended Final Resistance: 1.0 inch wg

## 2.8 EXTENDED SURFACE RETAINED MEDIA FILTERS

- A. Media: UL 900 Class 1 pleated, non-woven cotton fabric, scrim reinforced; supported by welded steel retainer; in 16 gage steel holding frame with corrosion resistant coating.
  - 1. Effective Media Area: 20 sq ft per 1000 cfm capacity rating.
  - 2. Nominal Size: 24 x 24 x 12 inches deep.

- B. Performance Rating: ASHRAE 52.
  - 1. Percent Dust Spot Efficiency: 95 percent.
  - 2. Percent Average Weight Arrestance: 99 percent.
  - 3. Initial Resistance at 500 fpm Face Velocity: 0.20 inch wg.
  - 4. Recommended Final Resistance: 0.50 inch wg above initial resistance.

## 2.9 HIGH EFFICIENCY PARTICULATE AIR (HEPA) FILTERS

- A. Media: UL 586, pleated, water-resistant glass fiber with separators of aluminum, vinyl coated aluminum or ribbons of filter media:
  - 1. Holding Frame: Galvanized steel, Stainless steel or Aluminum.
  - 2. Media to Frame Side Bond: Silicone or Neoprene.
  - 3. Face Gasket: Neoprene expanded rubber or Silicone.
  - 4. Nominal Size: 24 x 24 x 12 inches deep.
- B. Performance Rating:
  - 1. MIL-STD-282 Test 0.3 Micron Dioctyl Phthalate Smoke (DOP) Efficiency: 99.97 percent.
  - 2. Rated Airflow Capacity at 1.0 inch wg: 1150 cfm.
  - 3. Recommended Final Resistance: 3.0 inch wg.

## 2.10 WASHABLE PERMANENT PANEL FILTERS

- A. Media: 14 mesh steel screen, zinc electroplated, stainless steel or aluminum depending upon application, alternate layers of flat and herringbone crimp, four layers per inch; rod reinforced.
  - 1. Frame: 16 gage galvanized steel or 20 gage stainless steel
  - 2. Nominal Size: Design dependent
  - 3. Thickness: Design dependent.
- B. Performance Rating:
  - 1. Initial Resistance at 500 fpm face velocity: 0.10 inch wg
  - 2. Recommended Final Resistance at 500 fpm face velocity: 0.50 inch wg

## 2.11 FILTER FRAMES AND HOUSINGS

- A. Filter Retaining System shall be of extruded aluminum equal to 16ga thickness.
- B. Filter Retaining Modules shall be 12x24x3” and 24x24x3”.
- C. Outside perimeter shall be gasketed with WMS PVC .0125 x 500 foam stripping.
- D. Filter Retainer shall be interlocked together by means of a tongue fitting in a groove so when adjoined they form a seamless structure resulting in a zero bypass between frame system.

- E. Interior of frame shall incorporate a peripheral reducer to guide air filter header into the knife-edge seal to form a zero bypass barrier between filter and retaining frame.
- F. All joining pieces when assembled shall be welded.
- G. A 3 inch I Beam shall be inserted in an extruded slot on downstream side of frame between side of frame between each row running from top to bottom so entire filter bank will withstand 3 inch positive or negative pressure without deflection.
- H. Each individual frame shall be primed and powder coated.
- I. Filter Retaining Clips shall be permanently attached to inside of frame and will accommodate headered or box style filter.
- J. Air Filter Retaining System shall be Opti-Frame® pat. # 7,128,771 B2 available through Grainger: OF2424—24x24 Opti-Frame, OF1224—12x24 Opti-Frame, OF30IB—3” I-Beam (specify length in feet).
- K. Air Filters must be Air Handler labeled brand V Bank style through Grainger/Stanford filter contract.

## 2.12 FILTER GAGES

- A. Dwyer Magnehelic or approved equal.
- B. Direct Reading Dial: 3-1/2 inch diameter diaphragm actuated dial in metal case. Provide vent valves, black figures on white background, front calibration adjustment, range per design 2 percent of full scale accuracy.
- C. Accessories: Static pressure tips with integral compression fittings, 1/4 inch aluminum tubing, 2-way or 3-way vent valves in non-corrosive air streams. Fume exhaust will be stainless steel tips only.

## PART 3 –EXECUTION

### 3.1 INSTALLATION

- A. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- B. Install filter gage static pressure tips upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum, in accessible position. Adjust and level.

- C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.
- D. Provide filter gages on filter banks, installed with separate static pressure taps upstream and downstream of filters.

END OF SECTION