Suggested Specifications

Price FFU Fan Filter Unit with Reverse/Exhaust Airflow

Division 23 – Heating, Ventilating, and Air Conditioning
Section 23 37 13 – Diffusers, Registers, and Grilles

The following specification is for a defined application. Price would be pleased to assist in developing a specification for your specific need.

PART 1 – GENERAL

1.01 Section includes:
A. Fan Filter Unit.

1.02 Related Requirements
A. Section 01 30 00 – Administrative Requirements
B. Section 01 40 00 – Quality Requirements
C. Section 01 60 00 – Product Requirements
D. Section 01 74 21 – Construction/Demolition Waste Management and Disposal
E. Section 01 78 00 – Closeout Submittals
F. Section 01 79 00 – Demonstration and Training
G. Section 23 31 00 – HVAC Ducts and Casings
H. Section 23 32 00 – Air Plenums and Chases

1.03 Reference Standards
A. ASHRAE Standard 55 – Thermal Environmental Conditions for Human Occupancy; 2013
B. ASHRAE Standard 70 – Method of Testing the Performance of Air Outlets and Air Inlets; 2006
C. ASHRAE Standard 170 – Ventilation of Health Care Facilities; 2008
D. ASTM D610 – Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces; 2012
E. ASTM D714 – Standard Test Method for Evaluating Degree of Blistering of Paints; 2009
F. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; 2013
G. ASTM D1654 – Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments; 2008
H. ASTM D4752 – Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub; 2015
I. CSA Standard Z317.2-10 – Special Requirements for Heating, Ventilation, and Air-conditioning (HVAC) Systems in Health Care Facilities; 2010
J. IEST-RP-CC002.3 – Recommended Practice for Unidirectional-Flow of Clean Air Devices; 2009
K. SMACNA (SRM) – Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association; 2008
L. UL Standard 507 – Standard for electric fans; 1999
M. UL Standard 723 – Standard for Test for Surface Burning Characteristics of Building Materials; 2008
N. UL Standard 900 – Standard for Air Filter Units; 2015

1.04 Administrative Requirements
A. Pre-installation Meeting: Conduct a pre-installation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
B. Sequencing: Ensure that utility connections are achieved in an orderly and efficient manner.

1.05 Submittals
A. See Section 01 30 00 – Administrative Requirements for submittal procedures.
B. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate air flow, static pressure, and sound power levels for each of the second through sixth octave bands in dBA.
C. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication.
D. Certificates: Certify that air capacities, pressure drops, and selection procedures meet or exceed specified requirements.
E. Manufacturer's Installation Instructions: Indicate support and hanging details, installation instructions, recommendations, and service clearances required.
F. Project Record Documents: Record actual locations of units and control components.
G. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists.
H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements for additional provisions.
   2. Extra Filters: Furnish one spare filter as required per component originally supplied with filters.

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Suggested Specifications

1.06 Quality Assurance

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 Warranty

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Price Industries warrants that, at the time of shipment, the FFU will be free from defects arising from manufacturing, workmanship, or a failure to adhere to Price Industries' published catalog specifications and specified material. If Price Industries is notified in writing of any such defect within (1) year from the date of shipment, Price Industries will, at its sole option, repair, replace, or refund the purchase price paid by the Representative for the Product. Such remedies are the exclusive remedies available under this warranty.

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PART 2 – PRODUCTS

2.01 Fan Filter Unit

A. Basis of Design: Price Industries, Inc.
   1. Fan Filter Unit: Model FFU-1-X

B. General:
   1. The fan filter unit shall be supplied to exhaust room air at controlled velocities. The units shall include a high efficiency HEPA or ULPA filter.
   2. Modules sizes, electrical characteristics, efficiencies, capacities, and options shall be as scheduled on the drawings.

C. Fan Filter Unit [Price Model FFU]:
   1. Performance:
      a. The room sound level shall be less than 56 dBA when measured at 30 inches from the filter face at 90 fpm average face velocity in accordance with IEST-RP-CC002.3.
      b. The unit is to be factory sealed and tested to assure leakage is consistent with the filter.
   2. Construction:
      a. Plenum material shall be (**select one**):
         1. Aluminum
         2. 304 Stainless steel
      b. Face material shall be (**select one**):
         1. Aluminum
         2. 304 stainless steel
      c. Plenum shall be walkable up to 250 lbs.
      d. The diffuser plenum shall feature four (4) eyebolts at each plenum corner for securing the unit to structural supports above the ceiling. Each eyebolt shall be capable of supporting 75 lbs.
      e. The 51% free-area perforated distribution plate shall be secured to the face using quarter-turn fasteners with anti-slip, snap-in retainers and stainless steel retainer cables for ease of installation and removal.
      f. The diffuser shall be supplied with a round duct collar outlet.
   3. Filters:
      a. Filter type shall be (**select one**):
         1. High Efficiency Particulate Air (HEPA) filter shall provide 99.99% efficiency on .30 µm particulate, with an initial pressure drop of 0.52” wg at 100 fpm.
         2. Ultra-Low Penetration Air (ULPA) filter shall provide 99.9995% efficiency on .12 µm particulate, with an initial pressure drop of 0.64” wg at 100 fpm.
      b. The filter shall be room side removable and replaceable, framed in extruded aluminum with an integral cavity filled with a urethane gel to provide a leak-tight seal between the filter frame and the diffuser knife edge.
      c. Filter shall be UL 900 classified.
      d. Filter pack depth shall be 2.0”.
      e. Filter media shall be borosilicate micro-fiberglass.
   4. Plenum Finish shall be (**select one**):
      a. All aluminum components shall have B12 White baked-on powder coat finish.
         1. The paint finish must demonstrate no degradation when tested in accordance with ASTM D1308 (covered and spot immersion) and ASTM D4752 (MEK double rub) paint durability tests.
         2. The paint film thickness shall be a minimum of 2.0 mils.
         3. The finish shall have a hardness of 2H.
         4. The finish shall withstand a minimum salt spray exposure of 1000 hours.
         5. The finish shall have an impact resistance of 80 in-lb.
      b. All aluminum components shall have B25 baked-on enamel finish in a color to match a customer supplied sample.
      c. All aluminum components shall have mill finish.
      d. All stainless steel components shall have 2B mill finish.
   5. Face and frame finish shall be (**select one**):
      a. All aluminum components shall have White B12 Standard baked-on powder coat finish.
         1. The paint finish must demonstrate no degradation when tested in accordance with ASTM D1308 (covered and spot immersion) and ASTM D4752 (MEK double rub) paint durability tests.
         2. The paint film thickness shall be a minimum of 2.0 mils.
         3. The finish shall have a hardness of 2H.
         4. The finish shall withstand a minimum salt spray exposure of 1000 hours.
         5. The finish shall have an impact resistance of 80 in-lb.
      b. All aluminum components shall have B25 baked-on enamel finish in a color to match a customer supplied sample.
      c. All aluminum components shall have a mill finish on all exposed surfaces.
      d. All stainless steel components shall have #4 polished finish on all exposed surfaces.
   6. Fan:
      a. The centrifugal type fan shall be supplied with rubber mounts to isolate the motor/blower assembly from the diffuser plenum.
      b. Fans are to be of metal construction with a direct drive, forward curved impeller.
      c. Plastic construction shall not be acceptable.
   7. Electrical Systems:
      a. Single point power connection.

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b. Transformers shall be included where required for motor and unit operation.
c. A factory supplied disconnect switch shall be provided for disconnection of power to the terminal block.

8. Fan Motor:
   a. The fan motor shall be (**select one**):
      1. Permanent Split Capacitor (PSC):
      2. Electrically Commutated Motor (ECM):
         a. Constant Torque Program
            i. A constant torque program shall be provided to allow the ECM to vary the airflow with fluctuations in both upstream static pressure and filter pressure drop.
            ii. The constant torque program shall prevent unexpected motor operation or motor shutdown due to upstream static pressure fluctuations.
         b. Constant Flow Program
            i. A constant flow program shall be provided to allow the ECM to compensate for fluctuations in both upstream static pressure and filter pressure drop, providing constant airflow.
   b. Fan motor shaft directly connected to fan and isolated from casing to prevent transmission of vibration.
   c. Fan motor shall have internal thermal and overload protection.
   d. Fan motor shaft shall be directly connected to the fan impeller, and isolated from casing to prevent transmission of vibration.
   e. Motor/blower shall be accessible from the room side.
   f. Fan motor shall be supplied with a motor speed controller (**select one**):
      1. PSC solid-state speed controller
         a. The PSC speed controller shall provide variable speed control of the PSC motor.
         b. The PSC speed controller shall be supplied with an integral heat sink/mounting plate.
      2. ECM standard speed controller
         a. The ECM speed controller shall operate on 24 VAC supply voltage.
         b. The ECM speed controller shall have dual outputs to control up to two motors simultaneously.
         c. The ECM speed controller shall be supplied with a BAS interface to accept 2-10 VDC signal for variable speed remote control, as well as be able to remotely shut off via BAS signal.
         d. The ECM speed controller shall be supplied as a wall mounted kit, shipped loose for field installation.
      3. BACnet Flow Controller:
         a. The BACnet Flow Controller shall be supplied to facilitate adjustment or monitoring of the following parameters through the building networks:
            ii. Airflow rate
            iii. Motor rpm
            iv. Motor hours
            v. Filter status
            vi. Filter pressure drop displayed in inches of water
            vii. Filter hours
            viii. Filter reset

9. Options:
   a. Pre-filter: Unit shall be provided with a MERV 8 pre-filter.
   b. Power cord (**select one**):
      1. An eight foot (2.4 m) power cord shall be supplied for use with a 115 V power supply.
      2. A six foot (1.8 m) power cord shall be supplied for use with a 277 V power supply.
   c. Wall mounted PSC solid-state speed controller:
      1. The PSC speed controller shall provide variable speed control of the PSC motor.
      2. The PSC speed controller shall be supplied with an integral heat sink/mounting plate.
      3. The PSC speed controller shall be supplied as a wall mounted kit, shipped loose for field installation.
   d. Wall-mounted ECM speed controller:
      1. The wall-mounted ECM speed controller shall operate on 24 VAC supply voltage.
      2. The wall-mounted ECM speed controller shall be supplied with a BAS interface to accept 2-10 VDC signal for variable speed remote control, as well as be able to remotely shut off via BAS signal.
      3. The wall-mounted ECM speed controller shall be capable of daisy chain connections to connect and control thirty (30) fan filter units simultaneously.
   e. Filter and motor status shall be communicated by (**only available with BACnet Flow Controller, select one**):
      1. Status over BACnet
         i. The unit shall be field wired according to the manufacturer's instructions.
      2. Status over BACnet and Indicator LED
         i. The unit shall be field wired according to the manufacturer's instructions.
         ii. The LED indicator light shall be visible from the occupied area without opening the diffuser. The LED shall be green to indicate normal operation.
            1. The LED shall turn from green to red when the motor is not in operation.
            2. The LED shall turn from green to flashing red when the motor is in operation, and when the unit static pressure is below 0.1" wg.
            3. The LED light shall turn from green to yellow when the pressure drop across the filter exceeds the specified limit.
         a. The factory- calibrated motor BAS signal shall close a dry contact to generate a BAS signal when the motor is not operating.
         b. Unit shall be field wired to the terminal block according to manufacturer's instructions.

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f. BACnet daisy chaining (**only available with BACnet Flow Controller, select one**):
   1. 12 Foot RJ45 networking cable for BACnet daisy chain connection.
   2. 35 Foot RJ45 networking cable for BACnet daisy chain connection.

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PART 3 – EXECUTION

3.01 Examination

A. Verify that conditions are suitable for installation.
B. Verify that field measurements are as shown on the drawings.

3.02 Installation

A. Install in accordance with manufacturer's instructions.
B. See drawings for the size(s) and locations of fan filter unit inlets.
C. Support components individually from structure in accordance with SMACNA (SRM).
D. Do not support components from ductwork.
E. Connect to ductwork in accordance with Section 203 31 00.

3.03 Adjusting

A. Ensure supply air to the fan filter units by performing pitot traverse of the main supply duct.
B. Balance outlets according to manufacturer's recommendations.
C. Verify that field measurements are as shown on the drawings.

3.04 Field Quality Control

A. See Section 01 40 00 – Quality Requirements for additional requirements.

3.05 Cleaning

A. See Section 01 74 19 – Construction Waste Management and Disposal for additional requirements.

3.06 Closeout Activities

A. See Section 01 78 00 – Closeout Submittals for closeout documentation requirements.
B. See Section 01 79 00 – Demonstration and Training for additional requirements.

END OF SECTION 23 37 13

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