

Fan filter diffusers with room side replaceable filters and motors:

SECTION 233713 – DIFFUSERS

PART 1 – GENERAL

* 1. RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division \*\* Specifications Sections, apply to this section
   1. SUMMARY
2. Sections Includes:
   1. Fan Filter Diffuser
3. Related Sections:
   1. CODES AND STANDARDS
4. AMCA Standard 210, Laboratory Methods of Testing Fans for Ratings, 2007
5. ASHRAE Standard 51, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating, 2007
6. ASHRAE Standard 55, Thermal Environmental Conditions for Human Occupancy, 2017
7. ASHRAE Standard 70, Method of Testing the Performance of Air Outlets and Air Inlets, 2006
8. ASHRAE Standard 170, Ventilation of Health Care Facilities, 2017
9. ASTM Standard E84, Standard Test Method for Surface Burning Characteristics of Building Materials, 2016
10. ASTM D523, Standard Test Method for Specular Gloss
11. ASTM D3363, Standard Test Method for Film Hardness by Pencil Test
12. ASTM D3359, Standard Test Methods for Rating Adhesion by Tape Test
13. ASTM B117, Standard Test Method of Salt Spray (Fog) Testing
14. ASTM D2247, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
15. ASTM D522, Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
16. IEST-RP-CC-001, Institute of Environmental Sciences HEPA and ULPA Filters
17. IEST-RP-CC002, Recommended Practice for Unidirectional-Flow of Clean Air Devices
18. IEST-RP-CC006, Institute of Environmental Sciences Recommended Practices for Testing Clean Rooms
19. IES-RP-CC034, Institute of Environmental Sciences Recommended Practices for HEPA and ULPA Filter Leak Tests
20. CSA Standard Z317.2-10, Special Requirements for Heating, Ventilation, and Air-conditioning (HVAC) Systems in Health Care Facilities, 2010
21. CSA Standard 22.2 No. 113, Fans and Ventilators, 2015
22. UL 507, Standard for electric fans, 2018
23. UL 723, Standard for Test for Surface Burning Characteristics of Building Materials, 2008
24. UL 900, Standard for Air Filter Units, 2015
    1. SUBMITTALS
25. Product Data: For each type of produce indicated, include the following:
    1. Data Sheet: Indicate materials of construction, finish and mounting details and performance data including throw vertical and horizontal, static pressure, sound ratings.
    2. Source quality-control reports.

PART 2 - PRODUCTS

2.1 FAN FILTER DIFFUSERS

1. Fan filter diffusers with room side replaceable filters and motors
2. Manufacturers: Subject to compliance with requirements and performance listed in section 2.2 Source Quality Control, products by one of following manufacturer is acceptable
   1. Titus (Basis of Design)
   2. Tuttle and Baily
   3. Krueger
3. The fan filter unit shall be UL 507 listed, possessing a UL 900 filter.
4. Unit Construction
   1. The filter of the unit shall be removable from the room side.
   2. The fan and motor assembly shall be removable from the room side.
   3. The lid shall be constructed of .080” aluminum with ¼”-20 threaded inserts in four corners for suspension.
      1. (Optional) Unit lid shall be constructed of 304 Stainless Steel.
   4. The filter housing will be constructed of 0.063” thick aluminum with integral knife edge, which penetrates gel in the filter frame. Knife edge shall be an integral part of the diffuser mounting frame to assure leakage is consistent with that of the filter.
      1. (Optional) Filter housing shall be constructed of 304 Stainless Steel.
   5. Unit shall be provided with removable perforated face, constructed from 0.040” thick aluminum with 51% free area.
      1. (Optional) Perforated face to be constructed from 304 Stainless Steel.
   6. Unit plenum shall be walkable up to 250 lbs.
   7. The fan shall be direct drive, single inlet, single width, forward curve centrifugal type and shall be constructed of spark proof composite material.
   8. The motor shall be an electronically commutated (ECM) brushless DC motor delivering constant airflow by adjusting motor rpm or torque. Motor shall be fully enclosed, furnished with thermal overload protection and permanently lubricated sealed ball bearings. Bearings are rated for L-10 life of 80,000 hours.
   9. Fan filter unit shall be supplied with snap-in, 30% (20 PPI) polyurethane foam, washable pre-filter.
   10. The fan filter unit shall be equipped with a dedicated aerosol injection and challenge ports to allow field testing of filtered units in accordance with industry leakage standards.
5. Unit Controls:
   1. The fan filter unit is to be supplied with a universal control card allowing for user selected control via on-board potentiometer, 0-10V input, or network mode via MODBUS RTU. Dip switches will select the required mode of operation. In network mode the following control points shall be available for read and/or write functionality.
      1. Unit Start/Stop
      2. PWM setting (0-100%)
      3. Motor Speed (rpm)
      4. Default PWM setting (0-100%)
      5. Actual PWM setting (0-100%)
      6. Filter pressure drop [when equipped with Continuous Filter Monitor].
   2. (Optional) Unit shall be provided with Remote Mount Controller.
      1. Wall mounted speed controller shall allow for adjustment via potentiometer and visually display flow index.
      2. Unit control box and wall controller are supplied with ¼ inch spade terminals for field connection.
   3. (Optional) Unit shall be provided with Infrared Speed Control
      1. Unit shall be equipped with infrared sensor installed on the face of the unit.
      2. Unit shall be supplied with hand held infrared remote for adjustment of unit airflow setting.
6. Unit Filter
   1. Air filters shall be high-efficiency individually tested and certified panel filters consisting of aluminum enclosing frame, low-outgassing sealant, continuous glue bead separators and micro glass media filter pack.
   2. Filter shall be manufactured in a Class 10,000 (M5.5, ISO Class 7) cleanroom and tested in a Class 100 (M3.5, ISO Class 5) clean space.
   3. Filter media shall be one continuous pleating of micro glass fiber media formed into a uniform pack depth of 53mm.
   4. Pleat spacing shall be by continuous glue bead separators to prevent media-to-media contact and promote uniform airflow through the media pack.
   5. The media pack shall be completely encapsulated in a polyurethane sealant creating a rigid self-supporting pack. The sealant shall be low out gassing, fire-retardant and self-extinguishing.
   6. The enclosing frame, of anodized aluminum profiles, shall be joined together with secure internal corner clips to form a rugged and durable enclosure. Overall dimensional tolerance shall be within +0, -1/8”, and square within 1/4”.
   7. Filter frame shall have an integral gel channel that is filled with a cleanroom grade low outgassing polyurethane based gel.
   8. Filters shall be listed per Underwriters Laboratories as UL 900.
   9. Filters shall be tested in accordance with IEST-RP-CC-034.
   10. The filter shall be identified on a label indicating minimum efficiency, tested airflow and pressure drop.
   11. The unit shall be bar code serialized for individual unit identification.
   12. Filter shall be HEPA, Type J per IEST RP-CC-001.
   13. (Optional) Filter shall be ULPA, Type J per IEST RP-CC-001.
   14. (Optional) Filter shall be PTFE Boron-free ULPA, Type J per IEST RP-CC-001.
7. Finish: shall be one of the following:
   1. #04 Mill finish
   2. #26 White.
      1. The finish shall be a powder coat paint, baked at 425°F.
      2. The paint thickness shall be 2.0 – 3.0 mils, gloss at 60° per ASTM D523-89 of 60 – 70%
      3. The paint shall have a pencil hardness per ASTM D3363-92A of H – 2H,
      4. The paint shall have crosshatch adhesion per ASTM D3359-83 of 5B
      5. The paint must pass a salt spray test per ASTM B117-9048 of 1000 hours,
      6. The paint must pass a humidity test per ASTM D2247-92 of 1000 hours
      7. The paint must pass a conical mandrel per ASTM D522 of 1/8” conical bend, no cracking shown.
   3. #26A Antimicrobial White
      1. The finish shall be a powder coat paint, baked at 425°F.
      2. The paint thickness shall be 2.0 – 3.0 mils, gloss at 60° per ASTM D523-89 of 60 – 70%
      3. The paint shall have a pencil hardness per ASTM D3363-92A of H – 2H,
      4. The paint shall have crosshatch adhesion per ASTM D3359-83 of 5B
      5. The paint must pass a salt spray test per ASTM B117-9048 of 1000 hours,
      6. The paint must pass a humidity test per ASTM D2247-92 of 1000 hours
      7. The paint must pass a conical mandrel per ASTM D522 of 1/8” conical bend, no cracking shown.

*Optional Fan Filter Accessories/Construction*

1. (Optional) Filter load indicator: factory mounted and wired pressure switch and Red LED indicator light. When unit internal static pressure exceeds switch set point the LED is illuminated indicating the filter should be replaced.
2. (Optional) Airflow indicator light: factory mounted yellow LED indicator light to illuminate when motor is in operation.
3. (Optional) Continuous filter monitoring: Factory mounted and wired pressure transducer. Pressure transducer measures unit internal static and outputs a 0-10V signal. This signal can be monitored by a control device (by others) or via register 24 when MODBUS networking through the universal control card is utilized.
4. (Optional) Fan filter unit to be supplied with surface mount adapter for mounting in plaster or sheet rock ceiling.
5. (Optional) Fan filter unit to be supplied with {10” / 12”} round inlet adapter for field installation in lieu of 30% pre-filter.
   1. Source Quality Control
6. The manufacturer shall provide published performance data for fan filter units
   1. The fan filter unit shall be tested in accordance with ANSI/ASHRAE Standard 51-2007
   2. The fan filter unit shall be tested in accordance with ANSI/AMCA Standard 210-07

PART 3 – EXECUTION

3.1 EXAMINATION

1. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

1. Install Diffusers level and plumb.
2. Verify diffuser air patterns are as indicated on drawings during installation.
3. Ceiling-Mounted Outlets: Drawings indicate general arrangement of ducts, fittings and accessories. Air Outlet and locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. Where architectural features or other items conflict with installation, notify Engineer for determination of final location.
4. Install diffusers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors and fire dampers.

3.3 ADJUSTING

1. After installation, verify diffusers air patterns is as indicated on drawings, or as directed before starting air balance.

END OF SECTION 233713