

SPECIAL SPECIFICATION

SECTION 15766S

FILTER FAN UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Filter Fan Units

1.02 REFERENCES/PROJECT REQUIREMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. References :
 1. AMCA Bulletin 300
 2. IEEE Test Procedure 112A
 3. ASHRAE Test Standard 52.1
 4. IES Standard RP-CC-001-86.

1.03 SYSTEM DESCRIPTION

- A. Factory assembled, packaged, and pre-wired cleanroom ceiling units.
- B. Consisting of fan plenum assembly, filter retaining collar, and absolute filter.
- C. Provide fan and motor; filter support frame and hardware for gasket seal.
- D. Units to be dimensionally compatible with a cleanroom flush grid installed on nominal 48 inch by 24 inch centers.
- E. Overall height of Filter Fan unit shall not exceed, 21".
- F. Design units with sufficient structural strength to be supported from the ceiling grid.
- G. Airborne noise or operational unit shall not exceed 50-db (A)-measured 30 inches from the filter screen at 90 fpm.

- H. Unit capacity range: 90 feet per minute with 0.3 to 0.4 inch of water column for the filters and 1.0 inch of water column total.
- I. Units shall be UL listed.

1.04 SUBMITTALS

A. Provide the following with the Bid:

1. Reference list of five successfully operating installations similar in capacity, application and equipment type. Minimum service time on these installations shall be 1 year.
2. Manufacturer's complete cleaning, preparation, and painting specifications.
3. List of materials proposed for the fabrication of the units, including, but not limited to seals, gaskets, bolts, and isolators.
4. Preliminary fan performance curves showing rpm, brake horsepower, and static pressure versus air quantity handled for both clean and dirty filters at the design cfm.
5. Preliminary sound power data (ref 10 [-12] watts) for the fans running at design conditions with clean final filters and also the same capacity and higher static pressure representing dirty filter conditions, based on AMCA Bulletin 300. Provide data for an eight-octave band analysis, as well as an A-weighted db(A) rating.
6. Cross-sectioned drawing showing the configuration of components, outside dimensions for each size unit, weight of a complete unit.
7. Unit layout drawings showing installed dimensions.
8. Detailed information on mechanical, electrical (including motor locked rotor current and full load current data), control diagram, and other services necessary to evaluate installation requirements.
9. Vibration isolation system for all rotating components.

B. Provide complete shop drawings within 2 weeks of award of Contract. Documents to include at a minimum :

1. Complete specifications, descriptive drawings; catalog cuts, maintenance manuals, and descriptive literature on all components used in the unit assembly.

2. Include make, model, dimensions, capacity, and weight of equipment; field wiring diagrams, and electrical schematics.
3. Unit support details, including point loads and suggested connection details.
4. Corrected or supplemental technical data to the information furnished with the Bid.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Units shall be shipped in completed modular sections.
- B. Cleaned units to be sealed in polyethylene bags and boxed in heavy cardboard cartons.
- C. Units shall be shipped on pallets suitable for handling with forklift.

1.06 WARRANTY

- A. All equipment to be furnished under this Contract shall be guaranteed for a period of one year from the Date of Acceptance thereof against defective materials, of design, and workmanship. Acceptance shall be defined as the time when start-up and field-testing show that the equipment operates satisfactorily and meets all specifications herein.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. M+W Zander
- B. Envirco
- C. Clean Pak

2.02 MATERIALS

- A. Cabinet casing :
 1. The fan plenum housing lid shall be constructed of 0.080 aluminum with ¼-20 threaded inserts in four corners for suspension.
 2. The filter housing will be constructed of 0.063 inch thick aluminum.

3. Both the fan (lid) and filter housing shall have a polyurethane painted exterior, and sealed airtight.
4. A patented air baffle system will be furnished as an integral part of the fan plenum housing lid.
5. Total weight of the standard (2'x4') unit, excluding optional accessories shall be less than 65 lbs.
6. All units to be supported from the grid system without any additional supports required.

B. Fans and Motors :

1. The fan/motor will be direct drive, backward curve centrifugal type with permanently lubricated bearings.
2. Each unit shall consist of one fan assembly. FFU's shall be rated for 90fpm at 1.0-inch water column (WC); a minimum 0.6-inch WC shall be available for external pressure loss.
3. The fan and motor assembly shall be isolated from the main cabinet with rubber isolators or equivalent. The fan motor assembly shall be statically and dynamically balanced.
4. The motor shall be a permanent split capacitor type, rated for continuous duty, furnished with thermal overload protection, ON/OFF switch and solid state speed control.
5. Motor Rating:
 - a. Provide certified copy of test reports on an essentially identical motor tested in accordance with NEMA MG1-12 and IEEE Standard 112, Test Method B.
 - b. Motors shall have NEMA B speed-torque curve.

2.03 COMPONENTS

A. ULPA Filters :

1. ULPA filter to be factory tested and rated 99.9995 percent efficient at most penetrating Particle size (MPPS). All filters to be leak-free in accordance with IES recommended practices.

2. Filter media shall be microglass fiber with hot melt separators, sealed to the aluminum housing.
3. Filter fan unit will be installed in the ceiling from the top.
4. DOP smoke challenge is not permitted.
5. Atmospheric dust is certification procedure to be used for filter certification.
6. ULPA filters modules shall meet the combustible requirements of UL 586. (Section 3-1.2)
7. All filters in cleanrooms shall meet the requirements of NFPA 90A, IRI IM.17.11.1, and the IFC. Specification 15862S requires that all filters in cleanrooms meet the requirements of UL900.
8. The filter face guard will be epoxy powder coated expanded steel.

2.04 FABRICATION

- A. Units shall be manufactured to dimensional tolerances of plus or minus 1/16 inch to ensure proper field installation and prevent air bypass around individual units.

2.05 SOURCE QUALITY CONTROL

A. Factory Inspection:

1. The Sandia Designated Representative (SDR) reserves the right to inspect manufacturer's plant at any time during fabrication of units for this project.
2. Manufacturer to notify SDR when production is finished on the first units.

B. Factory Functional Tests:

1. Factory functional tests to be performed on one unit of each size.
2. Tests to be witnessed and accepted by SDR prior to manufacturing of additional units of the same size.
3. The following three functional tests shall be performed on each size unit:
 - a. Noise

- b. Leakage
 - c. Airflow performance.
4. Airborne Noise Test:
- a. To be conducted in the manufacturer's facility by an independent testing agency, which shall be routinely engaged in the practice of acoustical testing.
 - b. Testing agency to provide written summary of noise criteria (NC) values and testing methodology.
 - c. Measurement equipment shall conform to ANSI S1.4-1983, Specifications for Type 1 Sound Level Meters, and ANSU S1.11, Specifications for Octave, Half-Octave, and Third-Octave Band and Third-Octave Bank Filter Sets.
5. Leakage Test:
- a. Test each size of the fully assembled unit.
 - b. Leakage rate of the complete assembled filter fan unit including filter shall not exceed more than 2 percent of full volume airflow at the maximum design static pressure.
 - c. Submit a test procedure to the SDR for review prior to the witness test.
 - d. Test procedure to be submitted for approval prior to any testing activities.
6. Airflow Performance Test:
- a. Test each size of the fully assembled unit.
 - b. Velocity distribution at 90 feet per minute : - 5% / +10%
 - c. All units to meet the velocity distribution requirements across the entire leaving air face of the unit.

PART 3 - EXECUTION

3.01 INSPECTION

- A. FFU Manufacturer:
 - 1. The manufacturer shall inspect damaged units and determine whether repairs can be accomplished on site or if the units must be returned to the factory.
- B. SDR:
 - 1. The SDR must approve of any corrective action to be made.

3.02 FIELD QUALITY CONTROL

- A. Manufacturer's Startup Services and System Testing :
 - 1. Provide initial startup of units in the presence of Contractor and SDR.
 - 2. Provide in-place noise level test, performed by a certified independent testing agency.
 - 3. In case the noise level in the cleanroom exceeds the specified values, manufacturer to modify units to meet specifications at his own expense.
 - 4. Required modifications shall not decrease airflow rate.
 - 5. After re-adjustment, field displacement measurements shall be taken to determine its conformance with the design. These shall be performed by a certified independent testing agency.
 - 6. Log and record all information from every test. Document all adjustments and modifications made and submit to the SDR for review.
 - 7. Submit written notice to the SDR that all inspections, startup, testing, and checkout procedures are complete, and that all units are ready for use.

B. Filter Fan Unit Installer Testing and Certification Procedures :

1. The FFU filters will be certified by an independent testing agency under separate contract in accordance with the certification specification.
2. The SDR will notify the Contractor and Manufacturer prior to certification.
3. The SDR shall designate if the Contractor or Manufacturer shall correct deficiencies. The Contractor or Manufacturer shall correct deficiencies within 48 hours after testing.
4. After 48 hours, the SDR may take the corrective steps at the Contractor or Manufacturer's expense.

3.03 CLEANING

A. General Cleanliness Requirements :

1. Hardware exposed to the cleanroom interior or to the air-stream, regardless of size or complexity, shall be visibly free of oil, grease, particulate, chips, fibers, dust, dirt, etc., prior to installation in the cleanroom area.

B. General cleaning sequence:

1. Visual inspection
2. Vacuum removal of particulates
3. Cleaning agent wipe down
4. Vacuum removal of particulate.
5. Visual Inspection

C. Visual Inspection:

1. Inspect 100 percent of the surfaces for visible contamination with 100-watt lamp at a distance of 1 to 2 feet.
2. Magnification or similar aids (except for normally worn eyeglasses) shall not be used.

D. Cleaning Materials :

1. Low-shedding materials shall be used for wipe cleaning.
2. Acceptable Manufacturers:
 - a. Touch and Go Polyurethane Foam, Sills and Association, 50 mount.
 - b. Texwipe Cloths, Texwipe Company, Hillsdale, New Jersey.
 - c. Nylon Tricot 1068 cloths, Laminaire Company, Rahway, New Jersey
 - d. Miracle Wipe by International Clean Products

E. Cleaning Agents for Metal Surfaces :

Isopropyl alcohol (IPA) or a 50/50 mixture of IPA and distilled water.

END OF SECTION