F-F-1962
March 1, 1978

FEDERAL SPECIFICATION

FILTER, AIR EXTENDED MEDIA AREA TYPE, FOR USE IN AIR DISTRIBUTION SYSTEM

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers factory assembled air filters of the extended media area type with externally supported, non-supported, or self-supporting cartridges installed in permanent corrosion resistant metal holding frames or housings for removal or particulate matter in air conditioning, heating and ventilating systems.

1.2 Classification. All filters shall be UL approved, class 2 conforming to UL 900. Filters shall be of the following type cartridges and media grades (see 6.2).

1.2.1 Cartridges:

Type I - Prefilter - Externally supported or non-supported cartridge (bag type).
Type II - Afterfilter - Externally supported or non-supported cartridge, (bag type).

1.2.2 Media.

Grade A - 95 percent rated efficiency (ASHRAE Std. 52-76 using atmospheric dust).
Grade B - 85 percent rated efficiency (ASHRAE Std. 52-76 using atmospheric dust).
Grade C - 40 percent rated efficiency (ASHRAE Std. 52-76 using atmospheric dust).
Grade D - 30 percent rated efficiency (ASHRAE Std. 52-76 using atmospheric dust).

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

Federal Specification:

PPP-B-636 - Boxes, Shipping, Fiberboard.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issues, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Philadelphia, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Houston, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specifications:

MIL-P-116 - Preservation, Methods of.
MIL-P-514 - Plates, Identification, Instruction and Marking, Blank.
MIL-T-22085 - Tapes, Pressure-Sensitive Adhesive, Preservation and Sealing.

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc., (ASHRAE) Standard:

ASHRAE Std. 52-76 - Method of Testing Air Cleaning Devices Used In General Ventilation For Removing Particulate Matter.

(Application for copies should be addressed to the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., United Engineering Center, 345 East 47th Street, New York, NY 10017.)

National Fire Protection Association (NFPA) Codes and Standards:

No. 70 - National Electrical Code.
No. 90A - Air Conditioning and Ventilating Systems.

(Application for copies should be addressed to the National Fire Protection Association, 60 Battery March Street, Boston, MA 02110.)

Underwriters' Laboratories, Inc. (UL) Standards.

UL 900 - Air Filter Units.

(Application for copies should be addressed to Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago, IL 60611; 1655 Scott Blvd., Santa Clara, CA 95050; 333 Pfingsten Road Box 247, Northbrook, Il 60062; 1285 Walt Whitman Rd., Melville, LI NY 11749.)

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., Traffic Department, 1616 P Street, N.W., Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

3. REQUIREMENTS

3.1 Description.

3.1.1 Construction of each filter shall consist of the following:

3.1.1.1 Holding frames and housings. A permanent 16 gauge metal or heavier corrosion resistant holding frame with suitable cartridge or media retainer springs, clips or latches alone with cartridge supporting wirework and gaskets. There shall be no air leakage between permanent holding frame and cartridge that may cause air to bypass filter. Frame shall be provided with matching rivet holes to facilitate installation; or

A factory assembled side or bottom access 16 gauge metal or heavier housing complete with mating flanges, quick opening, double skin, insulated access doors, and gasketed channels to provide a leakproof support for filters.

After filter holding frames or housings for filters serving operating rooms shall be aluminum. After filter holding frames or housings for filters used for applications other than operating rooms shall be galvanized metal.

3.1.1.2 Cartridges.

3.1.1.2.1 A preformed, sealed and disposable cartridge of the pleated or extended area type rated UL class 2, shall be furnished for type I, grades C and D and type II, grades A and B filters.

3.1.1.2.1.1 Media for type I, grades C and D filters. Media for grade C shall be composed of thin glass fibers laid in a thin felt bonded with Phenolic Resin. Average thickness of felt shall not be less than 0:22 inches. Its minimum weight shall not be less than 8.0 grams per square foot. Flow resistance for grade C material shall not be more than .08 inches w.g. measured on flat sheets at 35 rpm velocity. Fastening methods used to maintain pleat shape, with staples, stays, or stitching shall be sealed and edge closure methods shall not cause air leakage for life of filter.

As an alternate, media for grade C may be a synthetic cotton fiber with a layer of synthetic material on clean air side, securely bonded. Average thickness of synthetic cotton fiber shall not be less than 0.18 inches. Its minimum weight shall not be less than 10.0 grams per square foot. Flow resistance shall not be less than .04 inches w.g. measured on flat sheets at 70 rpm velocity. Each filter shall have multiple pockets consisting of the base media with edges and seams 'heat sealed' or sewn in such a way as to prevent leakage during life of filter.

Media for grade D filters shall be of synthetic fibers with a PVC binder. Average thickness of synthetic fibers shall not be less than 0.50 inches. Its minimum weight shall not be less than 5.4 ounces per square yard (14.6 gr/ft). maximum resistance for grade D material shall not be more than .10 inches w.g. measured on flat sheets at 200 rpm. Fastening methods used to maintain pleat shape, with staples, stays, or stitching shall be sealed and edge closure methods shall not cause air leakage for life of filter.

3.1.1.2.1.2 Media for type II. Grades A and B filters. Shall be composed of this glass fibers laid in a thin felt bonded with Phenolic Resin. Average thickness of felt shall not be less than 0.22 inches. Its average weight shall not be less than 4.0 grams per square foot. Flow resistance for grade A material shall not be more than .52 inches w.g. and for grade B material not more than .24 inches w.g. measured on flat sheets at 35 rpm velocity. Each pleat or pocket shall be enclosed in woven or non-woven backing material. Fastening methods used to maintain pleat shape with staples, stays or stitching shall be sealed and edge closure methods shall not cause air leakage for life of filter.

3.1.1.3 Pressure drop.

3.1.1.3.1 Pressure drop shall be measured by the difference in pressure in the duct immediately before and after the filter.

3.1.1.3.1.1 Initial pressure drop. With clean filters, the initial pressure drop shall not exceed the values listed at the given face velocities at the filter's rated capacity. In no case, shall media velocity for type I, grade C and D filters exceed 125 rpm and for type II, grade A and B filters exceed 21 rpm.

Filter Face Velocity	500 fpm	625 fpm
Grade A	0.65" w.g.	0.70" w.g.
Grade B	0.42" w.g.	0.50" w.g.
Grade C	0.35" w.g.	0.45" w.g.
Grade D	0.35" w.g.	0.45" w.g.

3.1.3.1.2 Final pressure drop and dust holding capacity. The final pressure drop and dust holding capacity of each filter cartridge when operated at rated capacity shall not exceed the following:

Filter Face Velocity	500 fpm	625 fpm
Grade A	1.00" w.g.	1.20" w.g.
Grade B	1.00" w.g.	1.20" w.g.
Grade C	0.80" w.g.	1.00" w.g.
Grade D	0.70" w.g.	0.80" w.g.

Dusting Holding Capacity (grams)	500 fpm	625 fpm
Grade A	300	400
Grade B	430	500
Grade C	300	300
Grade D	700	700

3.1.1.3.1.3 Filter efficiency. Efficiency of filters shall be determined in accordance with ASHRAE Std. 52-76 using atmospheric dust. Efficiency shall not be less than the following:

	Initial	Average
Grade A	80%	88%
Grade B	58%	75%
Grade C	15%	30%
Grade D	10%	20%

3.1.1.4 One direct reading draft gauge per filter bank complete with static tips and necessary accessory items to provide zero adjustment and accurate operation.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government.

4.1.1 Certification.

4.1.1.1 Submit an individual test report, of not more than two years old, for a grade A, B, C and D type filter prepared by an independent testing laboratory using equipment, method and duct section as specified by ASHRAE Std, 52-76 for filter under test and acceptable to contracting officer, indicating that filters comply with the requirements of paragraph entitled "Pressure Drop" hereinbefore specified. When specified velocity of required filter is less than 500 rpm, the manufacturer's independent testing laboratory report complying with all requirements of this specification will be accepted.

4.1.1.2 All filters tested shall have been procured by the independent testing laboratory from the open market independent of manufacturer of these filters and a statement to this effect must accompany bid along with test report. The following data shall be recorded for each filter tested.

a. Media area in net effective square feet.
b. Type and physical characteristics of filter backer mat material employed.
c. Number of pleats and their individual length and height.
d. Method of securing pleat sides in a pleat form.
e. Type of fasteners used with a physical description of same.
f. Number of rows of fasteners and number of fasteners per row.
e. Sealing method used on fasteners and other penetrations of media.
h. A full description of media employed as to type of fiber, approximate fiber size, thickness of media and dispersement of fibers.
i. Percentage of open area of face plate and description of face plate and description of face plate construction.
j. A description of filter sag, if any, during testing.
k. A description of method by which tested filter was procured by the independent testing laboratory.

4.1.2 Examination of preparation for delivery. An examination shall be made to determine whether packaging, packing, and marking comply with the requirements of section 5. The sample unit shall be one shipping container. Sampling shall be in accordance with MIL-STD-105. The inspection level shall be S-2 with an AQL of 4.0 percent defective.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A or Commercial as specified (see 6.2).

5.1.1 Level A. Each filter shall be preserved and packaged in accordance with MIL-P-116, method III.

5.1.2 Commercial. The filters shall be packaged in accordance with normal commercial practice. The complete package shall be designed to protect the item against damage during shipment, handling and storage.

5.2 Packing. Packing shall be level A or Commercial as specified (see 6.2).

5.2.1 Level A. The filters packaged as specified in 5.1.1, shall be packed in a close-fitting box conforming to PPP-B-636, class weather-resistant. The box shall be closed and waterproofed in accordance with the appendix to the box specification.

5.2.2 Commercial. The filters, packaged as specified in 5.1.2, shall be packed in fiberboard boxes that will assure acceptance by common carrier and provide product protection against loss and damage during multiple shipments, handling and storage. The shipping container shall be in compliance with National Motor Freight Classification and Uniform Freight Classification.

5.3 Unitization. When shipments to Government depots are full car or truckload, the shipping containers shall be unitized to facilitate handling in accordance with normal commercial practice. The unitized load shall not exceed 2,500 pounds in weight, 63 inches in height, 56 inches in length, and 45 inches in width.

5.4 Marking. Marking shall be as specified in the contract or order.

6. NOTES

6.1 Intended use. Filters covered by this specification are intended for use in ventilation, air conditioning, and heating systems to remove particular matter including discoloring fractions found in the atmosphere.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents.

(a) Title, number, and date of this specification.
(b) Class, type, and grade required (see 1.2).
(c) Level of packaging and packing required (see 5.1 and 5.2).
(d) Marking required (see 5.4).

Preparing Activity:
VA -DMS

Military Interest:

DLA

Civil Agency Coordinating Activities

COMMERCE - NBS
GSA - FSS
HEW
NASA - JFK
VA - DMS

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See Section 2 of this specification to obtain extra copies and other documents referenced herein. Price 60 cents each.