F-F-310B
2 June 1984
SUPERSEDING
F-F-310a
June 6, 1967

FEDERAL SPECIFICATION

FILTER, AIR CONDITIONING: VISCOUS-IMPINGEMENT AND DRY MEDIA, REPLACEABLE

This specification was approved by the Assistant Administrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers throw-away, panel-type air filters designed for arresting particulate matter, in air-conditioning, heating, and ventilating systems in which the face velocity of the air stream is approximately 350 feet per minute (fpm) (1.78 meters per second (m/s)).

1.2 Classification. Filters shall be of the following types, grades, and sizes, as specified (see 6.2.1).

Type I - Throw-away frames and media
Type II - Permanent frames with replaceable media

Grade A - Standard dust-holding capacity
Grade B - High dust-holding capacity

Size	Nominal dimensions (Width by Height by Thickness) (inches)	(millimeters) (mm)
A	16 by 20 by 1	406 by 508 by 25
B	16 by 25 by 1	406 by 635 by 25
C	20 by 20 by 1	508 by 508 by 25
D	20 by 25 by 1	508 by 635 by 25
E	16 by 20 by 2	406 by 508 by 50
F	16 by 25 by 2	406 by 635 by 50
G	20 by 20 by 2	508 by 508 by 50
H	20 by 25 by 2	508 by 635 by 50
I	14 by 20 by 1	355 by 508 by 50
J	10 by 10 by 1	254 by 254 by 25
K	10 by 20 by 1	254 by 508 by 25
L	19 by 27 by 1	483 by 686 by 25
X	As specified	As specified

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues 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

Federal Standard:

Fed-Std-123 - Marking for Shipment (Civilian Agencies)

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Commercial Item Descriptions as outlined under General Information in the "Index of Federal Specifications, Standards, and Commercial Item Descriptions". The Index, which includes cumulative bimonthly supplements as issued, 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 and Commercial Item Descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.)

(Federal Government activities may obtain copies of Federal standardization documents, and the Index of Federal Specifications, Standards, and Commercial Item Descriptions from established distribution points in their agencies.)

Military Specifications:

MIL-P-116 - Preservation, Methods of
MIL-B-121 - Barrier Material, Greaseproofed, Waterproofed, Flexible

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 - Marking for Shipment and Storage
MIL-STD-130 - Identification Marking of U.S. Military Property
MIL-STD-794 - Parts and Equipment, Procedures for Packaging of

(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, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) Standards:

52 - 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., 1791 Tollie Circle, N.E., Atlanta, GA 30329.)

American Society for Testing and Materials (ASTM) Standard:

D92 - Flash and Fire Points by Cleveland Open Cup, Test Method for
D3951 - Commercial Packaging, Standard Practice for

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

Underwriters' Laboratories, Inc. (UL) Standard:

UL 900 - Test Performance of Air Filter Units

(Application for copies should be addressed to the Underwriters' Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Description. The filter units shall be of the flat panel-type designed and fabricated for disposal when, because of accumulated dust loading, the dust-load limit is reached, except that for Type II filters, the media frames shall be permanent and the media pad only shall be disposable. The filter media shall be dry or adhesive-coated in accordance with the manufacturer's standard practice.

3.2 First article. When specified (see 6.2.1), the contractor shall furnish one filter unit of the type, grade, and size specified for first article inspection and approval (see 4.2.1 and 6.3).

3.3 Standard commercial product. The air conditioning filter shall, as a minimum, be in accordance with the requirements of this specification and shall be the manufacturer's standard commercial product. Additional or better features which are not specifically prohibited by this specification but which are a part of the manufacturer's standard commercial product, shall be included in the air conditioning filter being furnished. A standard commercial product is a product which has been sold or is being currently offered for sale on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

3.4 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification unless otherwise specified.

3.5 Fire and casualty hazards. Filters shall meet the fire-resistant requirements of UL 900. Filters shall be either UL class 1 or UL class 2, at the option of the contractor. Classifications under UL 900 shall be interpreted as follows:

a. Class 1 - Filters which, when clean, do not contribute fuel when attacked by flame and emit only negligible amounts of smoke
b. Class 2 - Filters which, when clean, burn moderately when attacked by flame or emit moderate amounts of smoke or both

Adhesive coatings used on filters shall have a flashpoint of not less than 325 degree Fahrenheit (°F) (162.8° Celsius (C)) and shall conform to ASTM D92.

3.5.1 Certification. Prior to the approval of the sample filter furnished for first article inspection, if such inspection is specified, or prior to the first shipment, if first article is not required, the contractor shall submit evidence satisfactory to the contracting officer or his authorized representative that the filters to be furnished under this specification meet the UL standard cited in 3.5 Acceptable evidence of meeting the specified requirements herein shall be certificate of compliance (see 6.2.2), executed by an authorized official of the contractor stating that the items have been tested and that the units meet the requirements of the specified standards in 3.5, including specified methods of testing. Acceptable evidence that filters are in accordance with UL requirements will be the official UL listing mark or a certified test report (see 6.2.2) from a recognized independent laboratory

acceptable to the Government indicating that the filter has been tested and conforms as applicable to the requirements for class 1 or class 2 filters. Acceptable evidence that the adhesive coating meets the specified requirements will be a certified test report indicating that the adhesive has been tested in accordance with ASTM D92 and has a flash point not less than the value specified in 3.5. Such evidence must be acceptable to the contracting officer.

3.6 Performance. Filter performance shall be in accordance with the requirements of table I applicable to the type and thickness of filters being furnished. Performance shall be established on the basis of ASHRAE Standard 52.

3.6.1 Initial resistance. The initial resistance for clean filters shall not exceed the applicable values specified in table I when the filter is operated at face velocity of 350 fpm (1.78 m/s).

3.6.2 Average arrestance. The average arrestance shall be not less than the applicable values specified in table I, when the filter is operated to the final resistance at 350 fpm (1.78 m/s) face velocity. Final resistance for filters with 1 inch thickness shall be 0.5 inch water gage (wg) (1.21 kilopascal (kPa)); maximum final resistance for filters with 2 inch thickness shall be 1.0 inch wg (2.43 kPa).

3.6.3 Dust holding capacity. The minimum dust holding capacity shall be not less than the applicable values specified in table I. The capacity shall equal the amount of the test dust fed per unit net face area times its average arrestance. The dust holding capacity shall be obtained at 350 fpm (1.78 m/s) face velocity. The results of table I shall be obtained at the maximum final pressure drop specified in 3.6.2.

TABLE I. Filter performance requirements.

Grade	Nominal thickness (inch)	(mm)	Initial Resistance (inch wg)	(kPa)	Average Arrestance (%)	Dust holding capacity (grams per square (foot)	(meter)
A	1	(25)	0.12	(0.29)	60	60	(0.65)
	2	(50)	0.15	(0.36)	65	100	(1.08)
B	1	(25)	0.12	(0.29)	70	90	(0.97)
	2	(50)	0.15	(0.36)	75	160	(1.73)

3.7 Filter media. Filter media shall be suitable for the intended use and shall be composed of natural, synthetic, or inorganic fibers, or any combination of such fibers. When a particular type of media is required by the procuring activity, the type of media shall be as specified in the contract or purchase order (see 6.2.1). The media shall be nonallergic and nontoxic. The media shall be suitable for continuous use at temperatures up to at least 200°F (93.3°C). When specified (see 6.2.1), additional media for Type II filters shall be furnished in the quantity specified. Media for Types I and II filters normally requiring adhesive shall be furnished with the adhesive applied.

3.8 Construction. Filters shall be constructed with 90° corners. Frame edges shall be parallel to within one-sixteenth inch. Media pad reinforcement in the form of grilles, retaining grids, fabric netting, or equivalent shall be installed on both faces of the filter in accordance with the manufacturer's standard practice. The media shall be attached to the frame of Type I filters, and supported in the frame of Type II filters, in such a manner that the media pad will not slump or otherwise be permanently displaced under the conditions of maximum air velocity (350 fpm (1.78 m/s)) and filter resistance specified herein.

3.8.1 Frames. Frames of Type I filters shall be suitably formed to provide positive support for the media pad and sufficient structural rigidity for normal handling and installation. Wood-pulp products used for frame construction shall be sized to reduce moisture absorptivity. Frames for type II filters shall be aluminum or steel. as specified (see 6.2.1), and shall be designed to permit ready removal of the soiled media pad and replacement with a clean pad. Metal used for the Type II frames shall be corrosion-resistant or shall be suitably plated to resist corrosion.

3.8.2 Dimensions. Nominal dimensions of the filters shall be as specified in 1.2. The actual filter dimensions shall not differ from the nominal dimensions sepcified by more than the following:

a. Height: +0 inch (+0 mm), -5/8 inch (-16 mm)
b. Width: +0 inch (+0 mm), -5/8 inch (-16 mm)
c. Thickness: +0 inch (+0 mm), -1/8 inch (-3 mm)

3.8.2.1 Tolerances. Tolerances on dimensions, actual or nominal, shall not exceed ±1/16 inch (±1.5 mm).

3.9 Marking. Each filter unit shall be plainly marked with the following:

a. The name or trade name of the manufacturer or vendor
b. A distinctive model number, catalog designation, or equivalent marking
c. Air flow direction

If a manufacturer produces air-filter units of the same model at more than one manufacturing facility, each filter shall have a distinctive marking. Such markings shall identify the filter as the product of a particular facility and may be in code.

3.9.1 Military marking. When specified (see 6.2.1), each filter unit shall be stamped or otherwise marked in accordance with MIL-STD-130, to supplement markings specified under 3.9. Military marking shall be as permanent as the normal life expectancy of the filter, and shall include the applicable National Stock Number and such other essential information as may be specified or approved by the procuring activity.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Material inspection. The contractor is responsible for insuring that supplies and materials are inspected for compliance with all the requirements specified herein and in applicable referenced documents.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.2.1)
b. Quality conformance inspection (see 4.2.2)

4.2.1 First article inspection. The first article inspection shall be performed on one filter unit when a first article is required (see 3.2 and 6.2.1). This inspection shall include the examination of 4.4 and the tests of 4.5. The first article may be either a first production item or a standard production item from the supplier's current inventory provided the item meets the requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract. The manufacturer furnishing the first article sample shall provide (1) descriptive data or specification covering the filter construction, type and arrangement of media, the material and thickness of frames, and the type of adhesive, if used, and (2) the UL certification required under 3.5.1. The procuring agency shall review the submitted data to determine the acceptability of the sample for further first article testing.

4.2.2 Quality conformance inspection. The quality conformance inspection shall include the examination of 4.4, and the packaging inspection of 4.7. This inspection shall be performed on the samples selected in accordance with 4.3.

4.3 Sampling. Sampling and inspection procedures shall be in accordance with MIL-STD-105. All filters of the same type, grade, and size offered for delivery at one time shall be considered a lot for the purpose of inspection. Each lot shall be further limited to filters produced in the same manufacturing facility. The inspection level shall be level I and the Acceptable Quality Level (AQL) shall be 2.5 percent defective. If an inspection lot is rejected, the contractor may rework it to correct the defects, or screen out the defective units, and resubmit for a complete reinspection. Resubmitted lots shall be reinspected using tightened inspection. If the rejected lot was screened, reinspection shall be limited to the defect causing rejection. If

the lot was reprocessed, reinspection shall be performed for all defects. Rejected lots shall be separate from new lots, and shall be clearly identified as reinspected lots.

4.4 Examination. Each filter unit shall be examined for compliance with the requirements specified in section 3 of this specification. Any redesign or modification of the contractor's standard product to comply with specified requirements, or any necessary redesign or modification following failure to meet specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations and dimensional measurements. Noncompliance with any specified requirement shall constitute a defect.

4.4.1 Standards compliance. The contractor shall make available to the contracting officer or his authorized representative evidence of compliance with the applicable standards cited in section 3.

4.5 Tests. The filter unit shall be tested as specified. Failure to pass any test shall be cause for rejection.

4.5.1 Average arrestance. Determination of average arrestance shall be made in accordance with ASHRAE Standard 52.

4.5.2 Initial resistance. The initial resistance of the clean filter shall be established prior to determination of the average arrestance of the sample filter.

4.5.3 Dust holding capacity. The dust holding capacity shall be reported in accordance with ASHRAE Standard 52.

4.6 Certification of conformance. When specified on contracts not requiring a first article (see 6.2.1), the supplier shall submit to the procuring agency a report (see 6.2.2) indicating that the filter unit(s) to be furnished complies with the performance requirements of this specification. Tests shall have been conducted in accordance with the requirements of 4.5 except that the test filter unit need not necessarily be selected from filter units to be furnished under the contract or the manufacturer's current inventory of filter units. The filter unit tested shall, however, be representative of the design, performance, and manufacturing techniques applicable to the filter units being furnished under the contract. The manufacturer shall also furnish (1) descriptive data or specifications covering the filter unit construction, type and arrangement of media, material and thickness of frames, and type of adhesive, if used; and (2) the certificate of compliance with UL 900 required under 3.5.1.

4.7 Preparation for delivery inspection. An examination shall be made to determine compliance with the requirements of section 5. The sample unit shall be one unit prepared for shipment. 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 Preservation and packaging. Preservation and packaging shall be level A or commercial as specified (see 6.2.1).

5.1.1 Level A. Each filter unit shall be preserved and packaged method III in accordance with MIL-P-116 using a box conforming to PPP-B-636, class weather-resistant. Adhesive coated filters shall be wrapped with barrier material conforming to MIL-B-121, type II, grade A and secured with tape.

5.1.2 Commercial. Material shall be packaged in accordance with ASTM D3951.

5.2 Packing. Packing shall be level A, B, or commercial as specified (see 6.2.1).

5.2.1 Levels A and B. Packing shall be accordance with MIL-STD-794. Containers shall be selected from table I for the appropriate level.

5.2.2 Commercial. Material shall be packed in accordance with ASTM D3951.

5.3 Marking.

5.3.1 Military agencies. Shipments to military agencies shall be marked in accordance with MIL-STD-129.

5.3.2 Civil agencies. Shipments to civil agencies shall be marked in accordance with FED-STD-123.

6. NOTES

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

6.2 Ordering data.

6.2.1 Ordering data. Purchasers shall select the preferred options permitted herein and include the following information in procurement documents:

a. Title, number, and date of this specification.
b. Type, grade, and size required and dimensions for special size filters (see 1.2).
c. When a first article is required for inspection and approval (see 3.2, 4.2.1, and 6.3).
d. When a particular type of media is required and when additional media for type II filters shall be furnished and quantity required (see 3.7).
e. Whether type II media frames shall be aluminum or steel (see 3.8.1).

f. When military marking is required and the information to be included (see 3.9.1).
g. When a certificate of conformance is required (see 4.6).
h. Level of preservation and packaging and level of packing required (see 5.1 and 5.2).

6.2.2 Contract data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423 and invokes the provisions of paragraph 7-104.9(n) of the Defense Acquisition Regulation (DAR), the data requirements identified below will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of DAR 7-104.9(n) are not invoked, the data specified below shall be delivered in accordance with the contract requirements. Deliverable data required by this specification is cited in the following paragraphs:

PARAGRAPH	DATA REQUIREMENTS	APPLICABLE DD-1664
3.5.1, 4.6	Certificate of Compliance	DI-E-2121
3.5.1	Reports, test	DI-T-2072

6.3 First article. When a first article is required, it shall be tested and approved under the appropriate provisions of paragraph 7-104.55 of the DAR. The first article should be a first production item consisting of one complete filter unit or it may be a standard production item from the contractor's current inventory as specified in 4.2.1. The contracting officer should include specific instructions in all acquisition instruments regarding arrangement for examinations, tests, and approval of the first article.

MILITARY INTERESTS:

Custodians

Army - MI
Navy - YD
Air Force - 99

Review activities

Army - EA
DLA - GS

CIVIL AGENCY COORDINATING ACTIVITIES:

DOT - ACO
DCG
HHS-FEC, NIH
NASA - JFK
COM - NBS
GSA - FSS

PREPARING ACTIVITY:

Navy - YD

DoD project 4130-0274

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.