

MILITARY SPECIFICATION

FILTER, PARTICULATE,

HIGH-EFFICIENCY, FIRE RESISTANT

limited coordination Military specification has
 ared by Edgewood Arsenal based upon currently
 technical information, but is has not been
 promulgation as a coordinated revision of
 ification MIL-F-51068C. It is subject to
 However, pending its promulgation as a
 litary specification, it may be used in

1. SCOPE

1.1 Scope. This specification covers six sizes and seven types of filters
 for use in air cleaning or air filtering systems (see 6.1).

1.2 Classification. Filters covered by this specification shall be of
 the following sizes and types (see 6.2).

1.2.1 Sizes.

<u>Size</u>	<u>Nominal rated capacity</u> <u>cubic feet per minute (cfm)</u>
1	25
2	50
3	125
4	500
5	1000
6(M20)	1250

1.2.2 Types.

<u>Type</u>	<u>Frame Construction (See 3.2.1.1)</u>
IA	Marine Plywood
IB	Exterior Plywood
IC	Wood Particleboard
IIA	Aluminum Alloy
IIB	Cold Rolled Steel
IIC	Chromized Steel
IID	Stainless Steel

2. APPLICABLE DOCUMENTS

2.1 Government documents. 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:

SPECIFICATIONS

FEDERAL

NN-P-530	- Plywood, Flat Panel.
QQ-A-250/11	- Aluminum Alloy 6061, Plate and Sheet.
QQ-P-416	- Plating, Cadmium (Electrodeposited).
QQ-S-698	- Steel, Sheet and Strip, Low Carbon.
QQ-S-766	- Steel Plates, Sheets, and Strip - Corrosion Resisting.
QQ-S-781	- Strapping, Steel, Flat and Seals.
RR-W-370	- Wire Fabric, Steel, Hot-Dipped Galvanized.
TT-E-527	- Enamel, Alkyd, Lusterless.
TT-P-25	- Primer, Paint, Exterior (Undercoat for Wood, Ready-Mixed, White and Tints).
PPP-B-585	- Box, Wood, Wirebound.
PPP-B-601	- Boxes, Wood, Cleated - Plywood.
PPP-B-621	- Boxes, Wood, Nailed and Lock-Corner.
PPP-B-636	- Box, Fiberboard.
PPP-4-97	- Tape; Pressure-Sensitive Adhesive, Filament Reinforced.

MILITARY

MIL-R-6130	- Rubber, Cellular, Chemically Blown.
MIL-C-6183	- Cork and Rubber Composition Sheet; For Aromatic Fuel and Oil Resistant Caskets.
MIL-S-46055	- Steel, Sheet and Strip, Low Carbon, Chromized.
MIL-F-51079	- Filter Medium, Fire-Resistant, High Efficiency.

STANDARDS

FEDERAL

- Fed Std. No. 123 - Marking for Domestic Shipping (Civilian Agencies).
- Fed Std. No. 595 - Colors.

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 - Marking for Shipment and Storage.

DRAWINGS

US ARMY ARMAMENT COMMAND

EDGEWOOD ARSENAL

- DLA26-18-67 - Vibrating Machine, Filter Unit, Q110.
- DLB76-2-639 - Penetrometer, Filter Testing, DOP, Q107.
- DLB136-14-550 - Tester, Filter, Pressure Resistance, Q160.
- DLB136-42-850 - Penetrometer, Filter Testing, DOP, Q76.

(Copies of specifications, standards, drawings, and publications required by suppliers 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 otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM Standards

- A366 - Specification for Cold-Rolled Carbon Steel Sheets, Commercial Quality (Tentative).
- B209 - Specification for Aluminum Alloy, Sheet and Plate.
- D1056 - Sponge and Expanded Cellular Rubber Products (Tentative).
- E84 - Surface Burning Characteristics of Building Materials.
- A165-71 - Electrodeposited Coatings of Cadmium on Steel.
- A176-72 - Stainless and Heat-Resisting Chromium Steel Plate, Sheet and Strip.

MIL-F-0051068D(EA)

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

UNDERWRITERS' LABORATORIES, INC.

UL Standards

UL-586 - High Efficiency Air Filter Units.

(Copies of these standards may be obtained from Underwriters' Laboratories, Inc., 207 E. Ohio Street, Chicago, Illinois 60611.)

US DEPARTMENT OF COMMERCE

COMMERCIAL STANDARDS

CS35 - Hardwood Plywood.
CS132 - Hardware Cloth.
CS236 - Mat-Formed Wood Particleboard.
PS1 - Softwood Plywood, Construction and Industrial.

(Copies of these standards may be obtained from the US Government Printing Office, Washington, D. C. 20402.)

AMERICAN TRUCKING ASSOCIATIONS, INC.

National Motor Freight Classification

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

UNIFORM CLASSIFICATION COMMITTEE

Uniform Freight Classification

(Application for copies of these ratings, rules and regulations should be addressed to Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, Illinois 60606.)

3. REQUIREMENTS

3.1 Qualification. Particulate filters furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for the opening of the bids (see 4.2 and 6.4).

3.2 Materials and components.

3.2.1 Frame.

3.2.1.1 Frame material. The frame shall be made from the material as specified for each of the following filter types:

- Type IA - 3/4 inch plywood conforming to marine exterior type, grade A-A, of PS1 and fire retardant treated (see 3.2.1.2).
- Type IB - 3/4 inch plywood conforming to exterior type, grade A-A, group 1, of PS1, and fire retardant treated (see 3.2.1.2).
- Type IC - 3/4 inch fire retardant (see 3.2.1.2) wood particle board for exterior application with filler on both faces and conforming to type 2, grade B (with a minimum density of 45 pounds per cubic foot) class 2 of CS-236.
- Type IIA - Aluminum Alloy 6061-T6, 5052-H32, 5052-H34 or 3003-H14 sheet, 0.064 inch (14 gage B & S) minimum thickness conforming to QQ-A-250/11 or ASTM B209.
- Type IIB - Cold-rolled steel sheet, 0.0720 inch (14 gage USS) minimum thickness conforming to QQ-S-698 or ASTM A366. Prior to frame construction, the metal sections shall be cadmium plated in accordance with class 2, type II of QQ-P-416 or ASTM A165, type OS. Welded frame assemblies shall be plated after welding.
- Type IIC - Chromized steel sheet, 0.0720 inch (14 gage USS) minimum thickness, conforming to MIL-S-46055.
- Type IID - Stainless steel, 0.0720 (14 gage USS) minimum thickness, conforming to QQ-S-766 or ASTM A176 with the exception that the chemistry shall be in accordance with TP-409 of ASTM A268.

3.2.1.2 Flame spread classification. The plywood and wood particleboard frames shall have a flame spread classification of 25 or less when tested as specified in ASTM E84.

3.2.2 Gasket material. Gasket material shall be one of the following materials as specified in the contract or purchase order (see 6.2):

- (a) Cork and rubber composition conforming to type I or type II, class 2, grade A, soft of MIL-C-6183.

(b) Oil resistant, expanded cellular rubber in accordance with grade SCE-43 or 44 of ASTM 1056 and also qualified for listing on the qualified products list (QPL) for type II, grade A, medium of MIL-R-6130.

3.2.3 Faceguards. Unless otherwise specified in the contract or purchase order, faceguards shall be fabricated from galvanized 4 by 4 mesh, wire fabric (hardware cloth) made from 23 gage steel wire conforming to RR-W-370, or hardware cloth conforming to CS 132 (see 6.2).

3.2.4 Adhesives and sealants. Adhesives used to splice the medium, fasten gasket to filter face, and sealants or adhesives used to seal the filter pack to the frame shall be self-extinguishing type (see 6.3).

3.2.5 Filter medium. Unless otherwise specified in the contract or purchase order, the filter medium shall conform to MIL-F-0051079 (see 6.2).

3.2.6 Separators. Unless otherwise specified in the contract or purchase order the pleats of the filter medium shall be spaced by corrugated aluminum, 0.0015 inch thick, minimum, conforming to ASTM B209, Alloy 5052-H39 or 3003-H19 (see 6.2).

3.2.7 Paint finish for filter frame. Where required (see 3.3.7) the exterior surface of the frame shall receive one coat of primer conforming to TT-P-25, tinted to grey matching color No. 26134, Fed. Std. 595 and two coats of olive drab, No. X-34087 finish conforming to TT-E-527.

3.3 Manufacture and assembly.

3.3.1 Construction. Unless otherwise specified in the contract or purchase order each size of filter shall be constructed to conform to figure 1 (see 6.2). The dimensions for the various filters shall be as specified in table I. The fasteners used in the construction of the filter frames shall be compatible with frame materials (see 3.4.7).

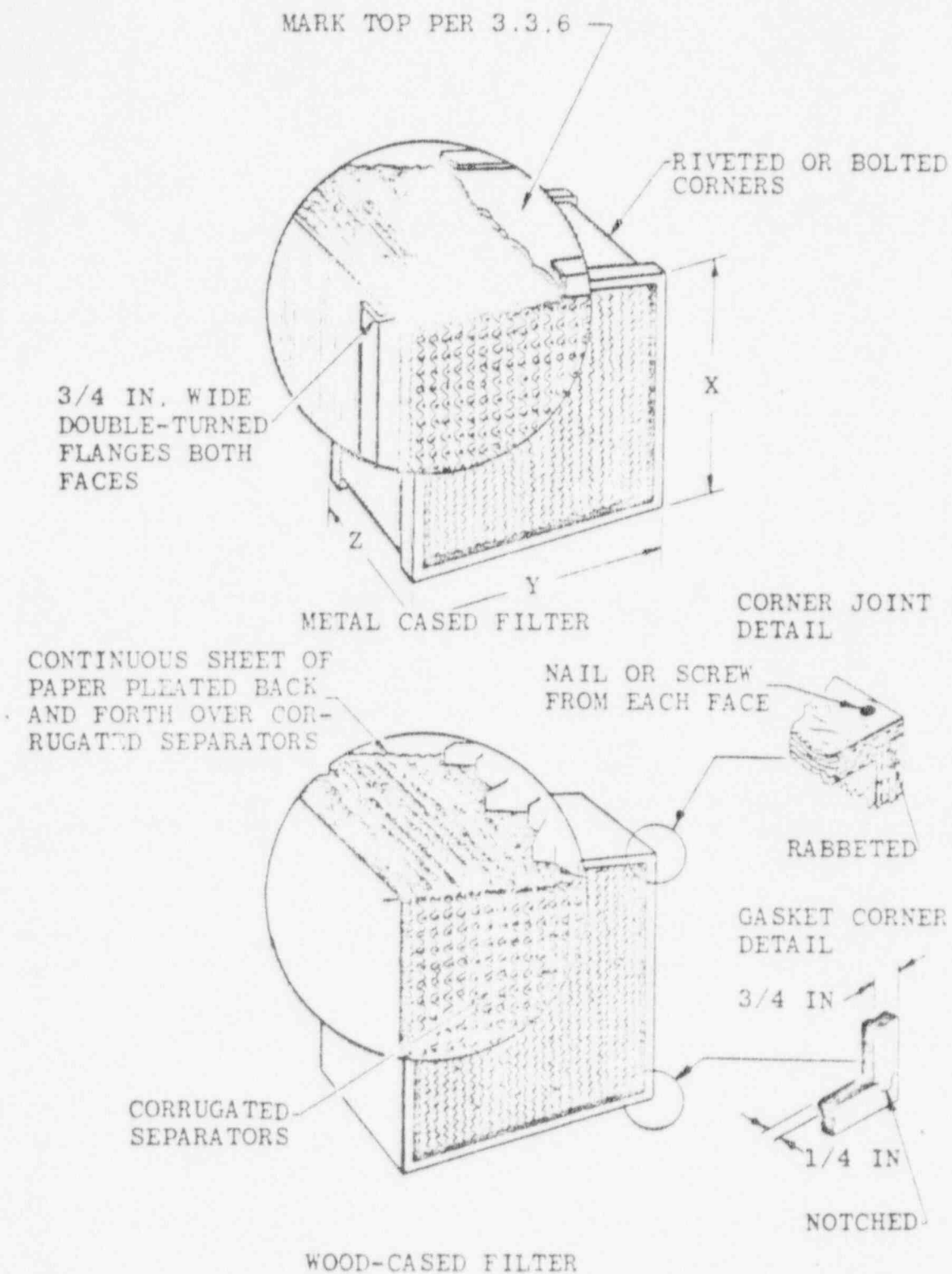


FIGURE 1

Table I. Filter dimensions

Filter size:	Dimensions, inches		
	X	Y	Z*
1	8 (+0, - 1/16)	8 (+0, -1/16)	3-1/16 (+1/16, -0)
2	8 (+0, - 1/16)	8 (+0, -1/16)	5-7/8 (+1/16, -0)
3	12 (+0, - 1/16)	12 (+0, -1/16)	5-7/8 (+1/16, -0)
4	24 (+0, - 1/8)	24 (+0, -1/8)	5-7/8 (+1/16, -0)
5	24 (+0, - 1/8)	24 (+0, -1/8)	11-1/2 (+1/16, -0)
6	24 (+0, - 1/8)	24 (+0, -1/8)	11-1/2 (+1/16, -0)

* Excluding the gasket, no part of the filter shall extend beyond this dimension.

3.3.2 Flatness and squariness. The faces of the frame shall be flat and parallel to within a total allowance of 1/16 inch. The frame shall be square to within a total allowance of 1/8 inch when measured diagonally across the corners of both faces.

3.3.3 Gasket assembly. Unless otherwise specified in the contract or purchase order the gasket shall be fastened to the influent face of the filter frame, and shall be made from the material specified in the contract or purchase order (see 6.2). The gasket shall be $1/4 \pm 1/32$ inch thick by $5/8 \pm 1/16$ inch wide and set back 1/16 inch from outer edges of the frame. The gasket shall be either molded in continuous unbroken form, or made from 4 strips joined at the corners by interlocking means, so that no gaps are visible and the joint shall be air tight. The gasket shall be continuously cemented to the face of the filter frame so as to prevent any air leakage between gasket and frame.

3.3.4 Faceguards. Unless otherwise specified in the contract or purchase order faceguards shall be used only on filter sizes 4, 5, and 6 (see 6.2). A faceguard shall be installed in each face of the filter in such a manner as to be essentially flat.

3.3.5 Medium installation. The filter medium shall be securely fastened to sides and ends of filter frame with adhesive to completely seal edges of medium to filter frame. Patching of holes or tears in the medium shall not be permitted.

3.3.5.1 Splices. Splicing of the medium shall not be permitted in sizes 1 and 2. Larger size filters shall not have more than one splice in the filter pack.

3.3.6 Marking. Each filter shall be marked on the top of the frame to indicate the manufacturer, model, serial number, test airflow direction, airflow resistance at rated airflow, and the results of the dioctylphtalate (DOP) smoke penetration test at rated airflow for all sizes of filters and at 20 percent of rated airflow for sizes 4, 5, and 6. In addition the wording "Install With This Side Up" shall be stencilled on the top of the frame in 3/8 inch minimum height letters. The top of the filter shall be perpendicular to the pleats in the filter medium (see figure 1).

3.3.7 Finish. The exterior surface of type I (wood) size 6 filter frames shall be painted as specified in 3.2.7. Unless otherwise specified in the contract or purchase order, sizes 1, 2, 3, 4, and 5 shall be unfinished (see 6.2).

3.4 Performance.

3.4.1 DOP smoke penetration. The total DOP smoke penetration through the filter medium, frame, and gasket which has been encapsulated, shall be no greater than 0.03 percent of upstream concentration at rated airflow and at 20 percent of rated airflow for all sizes when tested as specified in 4.3.4.1.

3.4.2 Resistance to airflow. The resistance to airflow at the rated airflow of the filter shall be no greater than 1.0 inch of water for filters, sizes 1, 2, 3, 4, and 5, and 1.25 inches of water for size 6 filters when tested as specified in 4.3.4.1.

3.4.3 Resistance to rough handling. The filter shall be free from cracked or warped frames; loose corners or joints; cracked adhesive; and loose or deformed medium, separators, or faceguards after rough handling as specified in 4.3.4.2 for 15 minutes at 3/4 inch total amplitude and a frequency of 200 cycles per minute with faces, pleats, and separators in a vertical position (see figure 1). Also, after rough handling, the same filter shall meet the requirements in 3.4.1 and 3.4.2.

3.4.4 Resistance to pressure. Filters sizes 4, 5, and 6 after being conditioned in accordance with 3.4.4.1 shall withstand the airflow and water spray environment of 3.4.4.2 without rupture of the filter medium; and within 15 minutes after completion of the pressure test, and still wet, the filter shall meet the DOP requirement of 3.4.1 at 20 percent airflow.

3.4.4.1 Conditioning. Prior to being tested for resistance to pressure, the filter shall be conditioned for 24 hours minimum in a chamber at $95^{\circ} \pm 5^{\circ}\text{F}$ and a relative humidity (RH) of 95 ± 5 percent.

3.4.4.2 Pressure testing. After conditioning as specified in 3.4.4.1, the filter shall be removed from the chamber, wrapped, transported to the test equipment, and tested within 15 minutes in accordance with 4.2.3.1 under the test conditions listed in table II.

Table II. Test conditions and requirements

Test conditions	Test requirements
Temperature	$95^{\circ} \pm 5^{\circ}\text{F}$
Relative humidity	$95 \pm 5\%$
*Rate of airborne water droplets flowing toward the filter	$1 \pm 1/4$ pound per minute per 1000 cfm of nominal rated filter capacity
Pressure differential across filter	10.0 ± 0.2 inch of water
Time to reach pressure differential	1/2 minute, maximum
Time duration at sustained water droplet flow and pressure differential across filter	1 hour, minimum
Air flow	That required for producing the above pressure differential

*This is defined as the rate of water flowing through the spray orifice less the fallout and drainage from the air duct walls between points of location of the spray orifice and one inch before the face of the filter.

3.4.5 Resistance to heated air. The DOP smoke penetration through the filter medium, frame, and gasket, when tested at the rated airflow of the filter and in accordance with 4.3.4.1, shall not exceed 3.0 percent after heated air at a temperature of $700^{\circ} \pm 50^{\circ}\text{F}$ has been passed through the filter (face of gasket and sides of filter not exposed) for no less than 5 minutes at the airflow rate for the size specified in table III and tested in accordance with 4.2.3.2.

Table III. Airflow rate for heated air

Filter Size	Minimum Test Airflow (cfm)	
1	25	
2	50	
3	125	
4	400	
5	1000	
6	1250	

For sizes 1, 2, 3, 4, and 5 (table III) an Underwriters' Laboratories (UL) label shall be acceptable objective evidence for compliance with this requirement when tested in accordance with the applicable test method in UL-506.

3.4.6 Spot flame resistance. After the removal of the test flame at each point of application, there shall be no sustained flaming on the downstream face of the unit and there shall be no transmittal of flame to the outside surfaces of the frame, gaskets, separators, medium, or adhesive, when tested as specified in 4.2.3.3.

For all sizes of filters a UL label shall be acceptable objective evidence of compliance with this requirement when tested in accordance with the applicable test method in UL-506.

3.4.7 Resistance to environmental exposure. The filters shall show no evidence of corrosion of metal frames, fasteners, or hardware cloth after any cycle and shall comply with the requirements specified in 3.4.7.3 when subjected to the environmental conditions, cyclic exposures, and testing specified in 3.4.7.1, 3.4.7.2, and 3.4.7.3.

3.4.7.1 Environmental conditions. The filters shall be subjected, in accordance with 4.2.3.4 to three 3-week cycles of environmental conditions each consisting of one week arctic (-65°F), one week desert (160°F and 10 percent RH), and one week tropical (113°F and 88 percent RH). The time between condition changes shall not exceed 15 minutes. The sequence of environmental changes for each cycle and the number and sequence of cycles shall be as specified in 3.4.7.2.

3.4.7.2 Cyclic exposure. The filters shall be subjected to 3 cycles (a total duration of 9 consecutive weeks) varied as follows:

Cycle 1 - arctic, tropical, desert
Cycle 2 - tropical, arctic, desert
Cycle 3 - arctic, desert, tropical

After each cycle, the filters shall meet the requirements specified in 3.4.7.3.

3.4.7.3 Testing after exposure cycles. The filters shall meet the DOP penetration requirements of 3.4.1 and the airflow resistance of 3.4.2 after cycle 1 and again after cycle 2. After cycle 3, the filters shall meet the rough handling requirements of 3.4.3.

3.5 Workmanship. The filter shall be free from foreign matter (dirt, oil, or viscous material) and damage, such as distorted or cracked frame; deformation or sagging of medium, separators, and faceguards, cracks in adhesive; and cracks and holes in exposed portions of the medium.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection.

4.1.1 Supplier's responsibility. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may utilize 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.

4.1.2 Government's responsibility. Unless otherwise specified, the Government will be responsible for the performance of the tests in 4.2. Samples will be forwarded to the laboratory designated by the contracting officer (6.2).

4.1.3 Objective evidence. The supplier shall provide objective evidence acceptable to the contracting officer that the requirements of 3.2, 3.4.5, 3.4.6, and section 5 for which specific inspection has not been provided in the specification have been satisfied.

4.2 Qualification.

4.2.1 Sample. A qualification sample of 11 each of size 4, 5, or 6 particulate filters, as specified, shall be manufactured using the same methods, materials, equipment, and processes as will be used during regular production (see 6.2). Where applicable, UL labels shall be affixed to the filters as evidence of conformance with 3.2.1.2, 3.4.5, and 3.4.6 prior to submission of the filters for qualification. Qualification of size 6 (M20) filter shall be extended to sizes 1 through 5 filters of the same type, materials and source of manufacturer. Qualification of size 5 filter shall be extended to sizes 1 through 4 filters of the same type, materials and source of manufacturer.

4.2.1.1 Samples with splice. If the supplier intends to deliver filters with a splice in the filter medium (3.3.5.1) three of the qualification samples shall contain a splice.

4.2.2 Inspection.

4.2.2.1 For examination. Each filter in the qualification sample shall be examined for all the defects in the classification of defects (4.3.3.3).

4.2.2.2 For tests. The qualification sample shall be tested for all the requirements of this specification in accordance with the groupings, sizes of filter, quantity, and sequence of tests shown in table IV. If applicable (4.2.1.1) one filter in each group A, B, and C shall contain a splice and so indicated.

4.2.3 Tests.

4.2.3.1 Resistance to pressure. The resistance to pressure for sizes 4, 5, and 6 filters shall be determined with the Q150 Pressure Resistance Tester (DLB 130-14-550).

4.2.3.2 Resistance to heated air. The resistance to heated air for all sizes of filters shall be determined using a single pass air preheater capable of delivering air at test airflow (table III) and temperature as specified in 3.4.5. In addition the temperature differential shall not vary 10° across the face of the filter at any one point. The filter shall be placed in the chamber when the temperature is $200^{\circ} \pm 10^{\circ}$ F and heated to $700^{\circ} \pm 50^{\circ}$ F within 15 to 30 minutes before the 5 minute exposure to 700° F air (see 6.5).

Table IV. Test groups and sequence

Group Quantity Size	Test sequence	
	Requirement	Test paragraph
:Group - A	: Resistance to rated airflow (3.4.2)	: 4.3.4.1
:Quantity - 4 filters	: DOP smoke penetration at rated air-	: 4.3.4.1
:Sizes - 4, 5, or 6	: flow and at 20% of rated airflow	:
:	: (3.4.1)	:
:	: Resistance to pressure (3.4.4)	: 4.2.3.1
:	: DOP smoke penetration at 20% of rated	: 4.3.4.1
:	: airflow only (3.4.1)	:
:Group - B	: Resistance to rated airflow (3.4.2)	: 4.3.4.1
:Quantity - 4 filters	: DOP smoke penetration at rated	: 4.3.4.1
:Sizes - 4, 5 or 6	: airflow and at 20% of rated air-	:
:	: flow (3.4.1)	:
:	: Resistance to rough handling (3.4.3)	: 4.3.4.2
:	: Resistance to heated air (3.4.5)	: 4.2.3.2
:	: DOP smoke penetration at rated air-	: 4.3.4.1
:	: flow only (DOP penetration require-	:
:	: ment from 3.4.5)	:
:Group - C	: Resistance to rated airflow (3.4.2)	: 4.3.4.1
:Quantity - 2 filters	: DOP smoke penetration at rated air-	: 4.3.4.1
:Sizes - 5 or 6	: flow and at 20% of rated airflow	:
:	: (3.4.1)	:
:	: Resistance to environmental exposure	: 4.2.3.4
:	: (3.4.7)	:
:	: Resistance to rated airflow at end of	: 4.3.4.1
:	: cycle 1 and cycle 2 (3.4.2)	:
:	: DOP smoke penetration at rated air-	: 4.3.4.1
:	: flow at end of cycle 1 and cycle 2	:
:	: (3.4.1)	:
:	: After third cycle:	:
:	: Resistance to rough handling (3.4.3)	: 4.3.4.2
:	: Examination for damage (3.4.3)	: 4.3.4.2
:	: Resistance to rated airflow (3.4.2)	: 4.3.4.1
:	: DOP smoke penetration at rated air-	: 4.3.4.1
:	: flow and at 20% rated airflow	:
:	: (3.4.1)	:
:Group - D	: Resistance to spot flame (3.4.6)	: 4.2.3.3
:Quantity - 1 filter	:	:
:Sizes - 1 through 6	:	:

4.2.3.3 Resistance to spot flame. The resistance to spot flame shall be determined in accordance with the applicable test method in UL-586.

4.2.3.4 Resistance to environmental exposure. The filter shall be exposed in an environmental chamber to the conditions specified in 3.4.7. After cycle 1 and again after cycle 2, the DOP smoke penetration and resistance to airflow shall be determined in accordance with 4.3.4.1. At the end of the third cycle, the filter shall be rough handled and examined for damage in accordance with 4.3.4.2 and the DOP penetration determined in accordance with 4.3.4.1.

4.2.4 Acceptance/rejection criteria.

4.2.4.1 Qualification examination and tests. Failure of any filter to comply with the requirements of this specification when examined and tested as specified in 4.2.2 shall disqualify the entire sample.

4.2.4.2 Underwriters' Laboratories labels. Where specified in 3.2.1.2, 3.4.5, and 3.4.6, UL labels shall be accepted as evidence of conformance with the aforementioned requirements when tested in accordance with the applicable tests methods in UL-586.

4.3 Regular production.

4.3.1 Lotting. A lot shall consist of the completed filters of the same size produced by one manufacturer, at one plant, from the same materials, under essentially the same manufacturing conditions. However, no more than one lot of filter medium in one week's filter production, and no more than 250 filters shall be represented in any one lot of finished filters.

4.3.2 Sampling for examination and tests. Sampling for examination and tests shall be conducted in accordance with MIL-STD-105. For major defect 101, resistance to rough handling, level 3-4 shall be used.

4.3.3 Inspection.

4.3.3.1 For examination and test. Sample filters shall be examined and tested in accordance with the classification of defects (4.3.3.3) and MIL-STD-105.

4.3.3.2 For critical defects. Each filter in the lot shall be tested for the critical defects listed in the classification of defects.

4.3.3.3 Classification of defects.(a) Filter, particulate, high-efficiency, fire resistant (figure 1).

<u>Categories</u>	<u>Defects</u>
<u>Critical:</u>	
1	DOP penetration (3.4.1)
2	Resistance to airflow (3.4.2)
<u>Major:</u> AQL 1.5 percent defective	
101	Resistance to rough handling (3.4.3)
AQL 1.0 percent defective	
102	Component incorrect, missing, or incorrectly assembled (3.3.1)
103	Dimensions not as specified (3.3.1)
104	Damage to exposed portions of medium (3.4.3)
105	Flatness incorrect (3.3.2)
106	Faceguard incorrect (3.2.3), (3.3.4)
107	Frame not square within 1/8 inch on diagonal (across face) (3.3.2)
108	Frame faces not parallel within 1/16 inch (3.3.2)
109	Filter pack shows patches or more than one splice (3.3.5.1)
110	Finish not as specified (3.3.7)
111	Gaskets not as specified (3.3.3)
112	Workmanship (3.5)
<u>Minor:</u> AQL 2.5 percent defective	
201	Faceguard not essentially flat (3.3.4)
202	Marking missing or illegible (3.3.6)

4.3.3.3 Classification of defects (continued).(b) Preparation for delivery (section 5).

<u>Categories</u>	<u>Defects</u>
<u>Critical:</u>	None defined
<u>Major:</u>	AQL 4.0 percent defective
101	Marking missing, incorrect, or illegible
102	Filter not oriented properly in box
103	Filter face not covered as specified

4.3.4 Tests.

4.3.4.1 Resistance to airflow and DOP smoke penetration. The resistance to airflow and DOP smoke penetration for sizes 1, 2, and 3 filters shall be determined with the Q76 DOP Penetrometer (DLB 136-14-850). The resistance to airflow and DOP smoke penetration for sizes 4, 5, and 6 filters shall be determined with the Q107 DOP Penetrometer (DLB 76-2-639).

4.3.4.2 Resistance to rough handling. The filters shall be rough handled with the Q110 Vibrating Machine, DLA 26-18-67), examined for damage and the DOP penetration determined in accordance with 4.3.4.1. Filters shall be tested without packing or packaging.

5. PREPARATION FOR DELIVERY

5.1 Packaging, level A. All packages shall be of the minimum cube to contain the item.

5.1.1 Sizes 1 through 6 filters. Filters of one size shall be preserved and packaged as specified herein (see table 1). Prior to packaging, the filters shall be oriented so that the pleats and separators are in the vertical position (see figure 1). The inlet and outlet openings of each filter shall then be covered with nominal 1/4 inch thick plywood conforming to Group B, PS-1, standard sheathing with exterior glue of MM-P-530. The plywood panels shall be cut to cover the openings so as to assure that the filter elements are not damaged during shipment and storage. Plywood covers shall be secured to the filter frame with two strips of 1/2 inch wide tape applied at the center of each cover and shall encompass the sides and both covers. The tape shall conform to type III of PPP-T-97. Each filter with the filter pleats and separators in the vertical position and covered as specified above, shall be enclosed in a fiberboard box conforming to RSC, grade V3c or W5c (type 1 load) of specification PPP-B-52a. Closure shall be in accordance with the requirements for weather-resistant boxes in the appendix of the box specification.

5.1.2 Size 6 filter (M20). The M20 filters shall be preserved and packaged as specified on the repair parts packaging data sheet which is identified by the Federal Stock Number.

5.2 Packing. Packing shall be level A, C, or interplant shipment as specified in the contract or order (see 6.2), and the containers shall be of minimum cube to contain the packaged filters.

5.2.1 Level A. A specified quantity of one size filters (see 6.2), packaged as specified in 5.1, shall be packed in overseas type, type 1 easy load, 250 pound weight limitation, wood shipping containers. The shipping containers shall conform to class 2, grade B, style optional of PPP-B-621; overseas type, style optional, grade B, of PPP-B-601; or class 3, style optional of PPP-B-585. The boxes shall be closed and strapped in conformance with appendix to the applicable box specification. Strapping shall conform to type 1, class A or B of QQ-S-781.

5.2.2 Level C. A specified quantity of one size filters (see 6.2), packaged as specified in 5.1, shall be packed in a domestic fiberboard box conforming to style RSC, type CF, class domestic, variety SW, grade 350, of PPP-B-636. The size and weight of the boxes shall not exceed the limitations of domestic grade 350, fiberboard boxes as specified in the above specification. The box shall be closed and reinforced in accordance with the requirements for domestic boxes in the appendix to PPP-B-636.

5.2.3 Interplant shipment (see 6.6). A uniform quantity of one size filters shall be packed to prevent damage in shipment from the supply source to the first receiving activity. Shipping containers shall be capable of stacking and supporting superimposed loads during shipment and shall comply with the rules and regulations applicable to the mode of transportation.

5.3 Marking. In addition to any special markings required by the contract or order, and to the special marking requirements specified herein, unit packages and shipping containers shall be marked in accordance with MIL-STD-129. Interplant shipment packs, 5.2.3, shall be marked in accordance with FED-STD-123 and the special markings specified herein.

5.3.1 Special Marking. The unit and shipping containers shall be clearly marked with the following information:

(a) Mark on two adjacent sides the word "UP" with an arrow toward the top of the containers.

(b) Mark the vertical position of the pleats.

(c) "FRAGILE" and "HANDLE WITH CARE" labels and markings shall be applied to two adjacent sides of the box.

5.4 Repair Part (size 6 M20 Filter). When this item is procured for storage and issue as a repair part, preservation, packaging, packing, and marking shall be as specified on the packaging data sheet which is identified the Federal Stock Number.

6. NOTES

6.1 Intended use. Each filter covered by this specification is intended to be used as a particulate filter, singly or in parallel, in air purifiers or air filtering equipment that will be used in air at temperatures up to 250° F and which may contain entrained moisture.

6.2 Ordering data. Procurement documents should specify:

- (a) The title, number, and date of this specification.
- (b) Filter size, 1.2.1.
- (c) Filter type, 1.2.2.
- (d) Gasket material, 3.2.2; and location if other than specified in 3.3.3.
- (e) Faceguard requirement if other than specified in 3.3.4, and material 3.2.3.
- (f) Construction if other than specified in 3.3.1.
- (g) Finish if other than specified in 3.3.7.
- (h) The level of packaging and packing.
- (i) The laboratory to which samples are to be sent for testing.
- (j) Filter medium, if other than specified in 3.2.5.
- (k) Separator requirement, if other than specified in 3.2.6.
- (l) Quantity of packages per shipping container.

6.3 Adhesives and sealants. Any adhesive or sealant found suitable during the qualification tests will be acceptable.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for such products as have, prior to the bid opening date, been tested and approved for inclusion in the applicable Qualified Products List, whether or not such products have actually been so listed by that date. The attention of suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification.

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Samples for qualification (4.2.1) shall be sent to, and information pertaining to qualification of products covered by this specification may be obtained from, the Director of Quality Assurance, Edgewood Arsenal, Edgewood Arsenal, Maryland 21010.

6.5 Heated air tester. A suitable tester which is currently used at Edgewood Arsenal consists of the following components connected in series in the order given: an air supply fan (1500 CFM @ 700°F, 4" S. P.), a gas fired air heater (700,000 Btu/hr), an air mixer (baffles and louvers), a test chamber, and an exhaust duct. Liquid propane gas (ca. 2500 Btu/ft.³) is used as a fuel for the heater and the exhaust is vented to the outside. Both the airflow and the temperature controls are adjustable. The holding fixture for the test filter shall permit all the air to pass through the filter and shall prevent the air from passing over the face of the filter gasket and sides of the filter. This tester is available for inspection at Product Assurance Directorate, Edgewood Arsenal, MD.

6.6 Interplant shipment. Packaging for supplies and materials that do not enter the military supply system. Typical are shipments from a vendor to a contractor, a sub-contractor, or a supplier to a military arsenal or plant.

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