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SUPERSEDING
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MILITARY SPECIFICATION

CLOTH, COATED, FUEL AND FLAME RESISTANT

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the requirements for seven types of vinyl coated cloth.

1.2 Classification. The coated cloth shall be of the following types as specified (see 6.2):

Type I - Cloth, Glass (Nonporous)
Type II - Cloth, Modacrylic (Nonporous)
Type III - Cloth, Glass (Porous)
Type IV - Cloth, Nylon (Fluorescent)
Type V - Cloth, Glass (Embossed face)
Type VI - Cloth, Glass (Oil Resistant)
Type VII - Cloth, Glass (Nonporous)

2. APPLICABLE DOCUMENTS

* 2.1 Government documents.

* 2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Officer in Charge, Navy Clothing and Textile Research Facility, 21 Strathmore Road, Natick, MA 01760-2490 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 8305

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SPECIFICATIONS

FEDERAL

- O-T-236 - Tetrachloroethylene (Perchloroethylene), Technical Grade
- PPP-P-1136 - Packaging and Packing of Coated (Plastic, Rubber) and Laminated Fabrics

MILITARY

- MIL-Y-1140 - Yarn, Cord, Sleeving, Cloth, and Tape-Glass
- MIL-H-5606 - Hydraulic Fluid, Petroleum Base, Aircraft Missile and Ordnance

STANDARDS

FEDERAL

- FED-STD-191 - Textile Test Methods
- FED-STD-595 - Color

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-1487 - Glossary of Cloth Coating Imperfections

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer).

* 2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

LAWS AND REGULATIONS

US POSTAL SERVICE MANUAL

(Copies of the manual may be obtained from the Superintendent of Documents, US Government Printing Office, Washington, DC 20402).

* 2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the

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nongovernment documents which is current on the date of the solicitation.

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT

National Motor Freight Classification

(Applications for copies should be addressed to the American Trucking Association, ATTN: Traffic Department, 1616 P Street, N.W., Washington, DC 20036).

UNIFORM CLASSIFICATION COMMITTEE, AGENT

Uniform Freight Classification

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D-1117-77 - NONWOVEN FABRICS

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

* 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. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Standard sample. When a standard sample is available, the finished coated cloth as applicable shall match the standard sample for shade and shall be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.3).

3.2 First article. When specified (see 6.2), the contractor shall furnish samples for first article inspection and approval (see 4.3).

3.3 Materials.

3.3.1 Base cloth.

3.3.1.1 Types I, III, V, and VII cloths. The base cloth to be used for the applicable type cloth shall be of a plain weave design and constructed from multifilament glass yarn for both the warp and filling. The finished base cloth shall conform to the requirements shown in Table I when tested as specified in 4.4.1.

3.3.1.2 Type II cloth. The base cloth to be used for the Type II coated cloth shall be of a plain weave design and constructed from a two ply spun yarn made from a copolymer of vinyl chloride and acrylonitrile (modacrylic)

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for both the warp and filling. The finished base cloth shall conform to the requirements shown in Table I when tested as specified in 4.4.1.

3.3.1.3 Type IV cloth. The base cloth to be used for the Type IV coated cloth shall be of a plain weave design and constructed from a bright high tenacity continuous filament nylon yarn for both the warp and filling. The finished base cloth shall conform to the requirements shown in Table I when tested as specified in 4.4.1.

3.3.1.4 Type VI cloth. The base cloth to be used for the Type VI coated cloth shall conform to Class C, Form 4, Fiber D, Cloth number 126 of MIL-Y-1140. The applicable requirements for cloth number 126 were extracted and included in Table I, in order to achieve simplification.

3.3.2 Coating compound. The coating compound shall be a composition of vinyl resin, suitably compounded, properly plasticized, and pigmented to meet the requirements specified herein.

3.3.3 Coated cloth.

* 3.3.3.1 Types I and II cloths. The Types I and II base cloths shall have the coating compound applied to both sides of the cloth, with the face side more heavily coated.

3.3.3.2 Types III and VI cloths. The Types III and VI base cloths shall have the coating compound applied equally to both sides to form a balanced coating.

3.3.3.3 Type IV cloth. Prior to applying the fluorescent coating compound, the Type IV base cloth shall be initially impregnated with a coating compound pigmented of any shade of white (see 4.4.1). The Type IV cloth shall then have the fluorescent coating compound applied equally to both sides to form a balanced coating.

3.3.3.4 Type V cloth. Prior to applying the coating compound to the face side of the base cloth, the cloth shall be initially impregnated with a sufficient amount of clear unpigmented coating compound to prevent wicking on the finished uncoated side (see 4.4.1). The pigmented coating compound shall then be applied to the face side of the base cloth followed by an embossing process to simulate a pebble grain finish.

3.3.3.5 Type VII cloth. The Type VII base cloth shall have the coating compound applied to the face side only, followed by an embossing process to simulate a fine grain finish.

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Table I - Physical requirements of base cloths

Characteristic	Type I 1/		Type II		Type III		Type IV	
	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)
Weight, ounces per square yard	2.92 2/	3.58 2/	4.50 2/	5.50 2/	3.46 2/	4.24 2/	2.07 2/	2.53 2/
Yarns per inch (2.5cm):								
Warp	38	42	72	76	32	36	36	40
Filling	38	42	46	50	30	34	36	40
Breaking strength, lbs:								
Warp	110 3/8 4/	-	110 3/8 4/	-	150 3/8 4/	-	110 3/8 4/	-
Filling	100 3/8 4/	-	100 3/8 4/	-	140 3/8 4/	-	100 3/8 4/	-

Characteristic	Type V		Type VI		Type VII	
	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)
Weight, ounces per square yard	4.77 2/	5.83 2/	4.90 2/	6.00 2/	2.92 2/	3.58 2/
Yarns per inch (2.5cm):						
Warp	32	36	30	36	52	56
Filling	30	34	30	34	48	52
Breaking strength, lbs:						
Warp	200 3/8 4/	-	225 3/8 4/	-	-	-
Filling	180 3/8 4/	-	200 3/8 4/	-	-	-

1/ As an alternate, the Type I cloth may conform to Class C, Form 4, Fabric No 1677 or 1675 of MIL-Y-1140.

2/ To convert ounces per square yard to grams per square metre (g/m^2), multiply by 33.9.

3/ To convert pounds force to newton (N), multiply by 4.448.

4/ No individual break shall be less than 80% of the requirement indicated.

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* 3.4 Physical requirements. The finished coated cloth as applicable, shall conform to the requirements shown in Table II and in 3.4.1 through 3.4.6 when tested as specified in 4.5.

Table II - Physical requirements of coated cloth

Characteristic	Type I		Type II		Type III		Type IV		Type V		Type VI		Type VII		
	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	
Weight, ounces per square yard	5.8 <u>1/</u>	-	6.0 <u>1/</u>	-	4.7 <u>1/</u>	-	11.9 <u>1/</u>	-	20.0 <u>1/</u>	-	10.5 <u>1/</u>	14.0 <u>1/</u>	0.02 <u>2/</u>	6.7 <u>1/</u>	-
Thickness, inches	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Breaking strength, lbs <u>9/</u>	110 <u>3/</u>	-	110 <u>3/</u>	-	150 <u>3/</u>	-	110 <u>3/</u>	-	200 <u>3/</u>	-	225 <u>3/</u>	-	-	185 <u>3/</u>	-
Warp	100 <u>3/</u>	-	100 <u>3/</u>	-	140 <u>3/</u>	-	100 <u>3/</u>	-	180 <u>3/</u>	-	200 <u>3/</u>	-	-	145 <u>3/</u>	-
Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tearing strength, lbs	6.0 <u>3/</u>	-	8.0 <u>3/</u>	-	8.0 <u>3/</u>	-	8.0 <u>3/</u>	-	12.0 <u>3/</u>	-	-	-	-	7.0 <u>3/</u>	-
Warp	4.0 <u>3/</u>	-	6.0 <u>3/</u>	-	8.0 <u>3/</u>	-	8.0 <u>3/</u>	-	12.0 <u>3/</u>	-	-	-	-	5.0 <u>3/</u>	-
Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Air permeability, cubic feet/min/sq ft.	-	-	-	-	150 <u>4/</u>	225 <u>4/</u>	-	-	-	-	-	-	-	-	-
Adhesion of coating, lbs per 2 inch (5.1cm) width	6.0 <u>5/</u>	-	6.0 <u>5/</u>	-	6.0 <u>5/</u>	-	6.0 <u>5/</u>	-	8.0 <u>5/</u>	-	12.0 <u>5/</u>	-	-	6.0 <u>5/</u>	-
Hydrostatic resistance, Water permeability (ml)	No leakage	-	No leakage	-	-	-	No leakage	-	No leakage	-	-	-	-	-	-
Initial	5.0	-	5.0	-	-	-	5.0	-	5.0	-	-	-	-	-	-
After abrasion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
After low temperature exposure	-	-	-	-	-	-	-	-	-	-	-	-	-	6/ and no leakage	7/ and no leakage
After heat aging	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydrostatic resistance, p.s.i	-	-	-	-	-	-	-	-	-	-	200 <u>8/</u>	-	-	-	-
Initial	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
After low temperature exposure	-	-	-	-	-	-	-	-	-	-	200 <u>6/</u>	200 <u>7/</u>	200 <u>8/</u>	-	-
After heat aging	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Table II - Physical requirements of coated cloth (cont'd)

	Type I		Type II		Type III		Type IV		Type V		Type VI		Type VII	
	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)	(Min)	(Max)
Flame resistance:														
Flaming time, seconds	-	2.0	-	2.0	-	2.0	-	- 10/ - 10/	-	2.0	-	2.0	-	2.0
Warp	-	2.0	-	2.0	-	2.0	-	-	-	2.0	-	2.0	-	2.0
Filling	-	3.0	-	3.0	-	3.0	-	5.0	-	7.5	-	-	-	3.0
Glow time, seconds	-	3.0	-	3.0	-	3.0	-	5.0	-	7.5	-	-	-	3.0
Warp	-	2.3 2/	-	2.3 2/	-	2.3 2/	-	7.0 2/	-	2.3 2/	-	3.0 2/	-	2.3 2/
Filling	-	2.3 2/	-	2.3 2/	-	2.3 2/	-	7.0 2/	-	2.3 2/	-	3.0 2/	-	2.3 2/
Char length, inches	-	No. 3	-	No. 3	-	No. 3	-	No. 3	-	No. 3	-	No. 3	-	No. 3
Blocking scale rating	-		-		-		-		-		-		-	
Colorfastness to:														
Light	-	-	-	-	-	-	-	Fair	-	-	-	-	-	-
Crocking	-	-	-	-	-	-	-	Fair	-	-	-	-	-	-
Wet	-	-	-	-	-	-	-	Good	-	-	-	-	-	-
Dry	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1/ To convert ounces per square yard to grams per square metre (g/m²), multiply by 33.9.

2/ To convert inches to centimeters (cm) multiply by 2.5.

3/ To convert pounds force to newton (N) multiply by 4.448.

4/ To convert cubic feet/min/sq ft to cm³/sec/cm², multiply by 0.508.

5/ To convert pound force per inch to newton/metre (N/m), multiply by 175.1.

6/ After low temperature exposure but prior to hydrostatic testing, the test specimens shall be examined for any evidence of tackiness, cracking, blistering, stiffening or delamination of the coating from the base cloth.

7/ After heat aging but prior to hydrostatic testing, the test specimens shall be examined for any evidence of tackiness, blistering, stiffening or delamination of the coating from the base cloth.

8/ To convert pounds per square inch to pascal (Pa), multiply by 6894 (6.894 X 10³).

9/ No individual break shall be less than 80% of the requirements indicated.

10/ The tip of the flame shall not pass beyond the top edge of the test specimen before 42 seconds after the start of the burner flame when tested as specified in 4.5.

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3.4.1 Resistance to aromatic hydrocarbons (applicable to all types). The coated cloth, after exposure to aromatic hydrocarbons, shall not curl, become stiff, crack, flake or show any evidence of the coating separating from the base cloth when tested as specified in 4.5.

3.4.2 Resistance to aliphatic hydrocarbon fluid (applicable only to Type VII). The coated cloth after exposure to aliphatic hydrocarbon fluid, shall not curl, become stiff, crack or show any evidence of the coating separating from the base cloth when tested as specified in 4.5.

3.4.3 Resistance to oil (applicable only to Type VI). The coated cloth shall show no evidence of seepage of oil through the material when tested as specified in 4.5.

3.4.4 Resistance to accelerated weathering (applicable only to Type VI). The coated cloth after exposure to accelerated weathering, shall not become soft tacky, stiff, brittle or show any evidence of the coating separating from the base cloth when tested as specified in 4.5.

3.4.5 Abrasion resistance.

3.4.5.1 Types I and II. The Types I and II coated cloth shall not show any visible exposure of the base cloth after being abraded for a minimum of 500 cycles.

3.4.5.2 Type III. The Type III coated cloth shall not show any visible exposure of the base cloth after being abraded for a minimum of 400 cycles.

3.4.5.3 Type V. The Type V coated cloth shall not show any visible exposure of the base cloth after being abraded for a minimum of 1000 cycles.

3.4.5.4 Type VII. The Type VII coated cloth shall withstand a minimum of 650 cycles per millimeter of vinyl thickness before rupture of one or more threads of the base cloth.

3.4.6 Corrosion (applicable only to Types I, II, III, IV, V, and VII). The coated cloth shall be noncorrosive to aluminum when tested as specified in 4.5.

* 3.5. Color. The color of the coated side(s) of the applicable type finished cloth shall be as specified (see 6.2), and shall match the standard sample when available (see 3.1 and 6.3). When a standard sample is not available, the color shall approximate the following FED-STD-595 and Air Force Shade Numbers:

Type I - Gray 36231
 Green 34424
 Green 34092
 Gray 36440
 Black 37038 (face side)/Aluminum 17178 (back side)

The Type I material may also be dyed any suitable shade of black.

Type II - The color shall approximate the applicable color number of FED-STD-595.

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Type III - Green 34516

Type IV - Air Force Red 1556.

Type V - Maroon 20061

The Type V material may also be dyed any suitable shade of tan.

Type VI - Green 34079

Type VII - Green 24516

3.6 Matching. The color of the finished coated cloth as applicable, shall match the standard sample when available under artificial daylight having a color temperature of 7500° ($\pm 500^{\circ}$) Kelvin and shall be a good approximation to the standard sample under incandescent lamplight at 2800° ($\pm 100^{\circ}$) Kelvin.

3.7 Length and put-up. The coated cloth as specified below, shall be put-up in rolls as specified in PPP-P-1136. The cloth shall be wound free of wrinkles, with the edges of the cloth not protruding beyond the ends of the winding tube.

- (a) For Types I, II, III, and IV, the length of any one roll shall be between 80 to 120 yards (72 to 108m). The maximum number of pieces per roll shall be three and no single piece shall be less than 20 yards (18m).
- (b) For Type V, the minimum length of any one roll shall be 50 yards (45m), and shall be in one continuous piece.
- (c) For Types VI and VII, the length of any one roll shall be between 100 to 150 yards (90 to 135m). The maximum number of pieces per roll shall be six and no single piece shall be less than 20 yards (18m).

3.8 Width. Unless otherwise specified (see 6.2), the minimum width of the coated cloth exclusive of the selvages shall be as shown below. Both selvage edges may be trimmed.

- (a) For Types I, II, III, IV, and V, the width shall be 36 inches (90cm).
- (b) For Type VI, the width shall be 30 inches (75cm).
- (c) For Type VII, the width shall be 52 inches (130cm).

3.9 Odor. The coated cloth shall be free from any objectionable odor. Odor characteristic of the coating compound is not considered objectionable.

3.10 Workmanship. The finished coated cloth shall conform to the quality established by this specification. The occurrence of defects shall not exceed the applicable acceptable quality levels.

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

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contract or order, the contractor may use his own or any other facilities suitable for 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 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.2 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification.

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

1. First article inspection (see 4.3).
2. Quality conformance inspection (see 4.4).

4.3 First article inspection. When required, the first article sample of the finished cloth submitted in accordance with 3.2 shall be visually inspected for shade, finish, and appearance, and shall be tested for chemical and physical properties in accordance with 4.4.

4.4 Quality conformance inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated herein.

4.4.1 Component and material inspection. In accordance with 4.1 above, components and materials shall be tested in accordance with all the requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document. A certificate of compliance shall be submitted and will be acceptable for the material identification of the coating compound specified in 3.3.2, for the white pigmented coating compound requirements specified in 3.3.3.3, and for the clear unpigmented coating compound requirement specified in 3.3.3.4. In addition, testing shall be performed on the base cloth as applicable for the characteristics specified and in accordance with the referenced test methods of FED-STD-191 whenever applicable. The sample unit shall be 1 yard (0.9m) full width. The sample size (number of sample units) shall be as specified in Table III. The lot size shall be expressed in units of 1 linear yard (0.9m). The lot shall be unacceptable if one or more sample units fail to meet any requirement specified.

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Table III - Sample Size

Lot size (yards)	Sample size
800 or less	2
801 up to and including 22,000	3
22,001 and more	5

Table IV - Component testing

Component	Characteristic	Requirement Paragraph	Test Method
Types I, III, V, and VII base cloth as applicable	Yarn:		
	Identification	3.3.1.1	<u>1/</u>
	Weave	3.3.1.1	<u>Visual 2/</u>
	Weight	Table I	5041
	Yarns per inch		
	Warp	Table I	5050
	Filling	Table I	5050
	Breaking strength:		
	Warp	Table I	5100
	Filling	Table I	5100
Types II base cloth	Yarn:		
	Identification	3.3.1.2	<u>1/</u>
	Ply	3.3.1.2	<u>1/</u>
	Weave	3.3.1.2	<u>Visual 2/</u>
	Weight	Table I	5041
	Yarns per inch:		
	Warp	Table I	5050
	Filling	Table I	5050
	Breaking Strength:		
	Warp	Table I	5100
Filling	Table I	5100	
Type IV base cloth	Yarn:		
	Identification	3.3.1.3	<u>1/</u>
	Weave	3.3.1.3	<u>Visual 2/</u>
	Weight	Table I	5041
	Yarns per inch:		
	Warp	Table I	5050
Filling	Table I	5050	
Type IV base cloth	Breaking strength:		
	Warp	Table I	5100
	Filling	Table I	5100

1/ Unless otherwise specified, a certificate of compliance shall be submitted and will be acceptable for the stated requirements.

2/ One determination shall be performed per sample unit and the results reported as "pass" or "fail".

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4.4.2 Examination of the end item. The end item shall be examined in accordance with the classification of defects at the inspection levels and acceptable quality levels (AQL's) set forth below.

4.4.2.1 Yard-by-yard examination. The required yardage of each roll shall be visually inspected on one side only; however, the side examined shall be alternated on every other roll (except Types V and VII cloths) for defects listed below. The same yardage shall be given a thorough light inspection for pinholes only in accordance with MIL-STD-1487. The defects found shall be counted regardless of their proximity to each other, except where two or more defects represent a single local condition of the cloth in which case only the more serious defect shall be counted. The sample unit shall be one linear yard (0.9m). The sample size shall be in accordance with inspection level II. The acceptable quality levels shall be 2.5 major defects and 4.0 total defects (major and minor combined) per 100 units (yards-meters). The number of rolls from which the sample is to be selected shall be in accordance with Table V. An approximate equal number of yards (meters), shall be examined from each roll in the sample.

Defects	Classification	
	Major	Minor
Any hole, cut or tear, surface scratch or abraded area, resulting in exposure of the base cloth	X	
Any uncoated area	X	
Any area where coating is noticeably thinner	X	
Any blister, tunneling, or delamination of coating	X	
Any lump or heavily coated area		X
Crease or wrinkle resulting in doubling or adhesion of surfaces that cannot be corrected by manual pressure	X	
Any surface scratch or abraded area, not exposing the base cloth		X
Coating cracked or checked	X	
Coating not applied over full width of base cloth	X	
Any pinhole	X	
Any transparent area or window resulting from improper distribution of pigment	X	
Any puckering, waviness, or distortion	X	
Color off shade, not uniform, mottled, or spotted		X
Any area of general uncleanness		X
Any tackiness; coating will adhere and not readily unroll	X	
Any objectionable odor other than that which is characteristic of the coating compound		X
Any spot, stain, or streak:		
1. Less than 1 inch (2.5cm) (longest dimension in any direction).		X
2. 1 inch (2.5cm) or more (longest dimension in any direction).	X	
Curled, folded, scalloped or rolled edge		X
Width less than the minimum specified		X

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Defects	Classification	
	Major	Minor
Embedded foreign matter affecting appearance or serviceability:		
a. Seriously	X	
b. Not seriously		X
Any brittle coating (cracks, when flexed)	X	

Table V - Sample size

Lot size (yards)	Sample size (rolls)	Maximum Number of defects acceptable in sample 2/
Up to 1200 inclusive 1/	3	0
1201 up to and including 3200	5	0
3201 up to and including 10,000	8	0
10,001 up to and including 35,000	13	0
35,001 up to and including 150,000	20	1
150,001 and over	32	2

1/ If lot contains fewer than 3 rolls, each roll in the lot shall be examined.

2/ Applicable to length examination only (see 4.4.2.2).

4.4.2.2 Examination for length.

4.4.2.2.1 Examination for length in individual roll. Each individual roll in the sample shall be examined for number of pieces, length of pieces, and for total length. The sample unit for this examination shall be one roll. The sample size (number of rolls selected as sample) and the maximum acceptable number of defects shall be as shown in Table V. Any of the following shall be considered a defect with respect to length.

Any roll length less than the minimum or more than the maximum specified.

Any roll containing more than the specified number of pieces.

Any piece in roll less than the specified length.

Any roll with a total length more than 2 yards (1.8m) less than that marked on ticket.

4.4.2.2.2 Examination for total yardage in sample. The rolls examined shall be those selected for examination of individual rolls as specified in

4.4.2.2.1. The lot shall be unacceptable if the total of the actual lengths of rolls in the sample is less than the total of the lengths marked in the roll ticket.

4.4.2.3 Examination of preparation for delivery. The examination of preparation for delivery shall be made in accordance with PPP-P-1136.

4.5 Testing of the end item. The methods of testing specified in FED-STD-191, wherever applicable, and as listed in Table VI shall be followed. The physical and chemical values specified in section 3 apply to the average

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of determinations made on a sample unit for test purposes as specified in the applicable test method. The sample size shall be in accordance with Table III. The lot will be unacceptable if one or more units fail to meet any requirement specified.

Table VI - End item tests

Characteristic	Requirement paragraph	Test method
Weight (all types)	3.4	5041
Thickness (Type VI only)	3.4	5030
Breaking Strength (all types)		
Warp	3.4	5100
Filling	3.4	5100
Tearing strength (Types I, II, III, IV, V, and VII as applicable):		
Warp	3.4	5134 <u>1/</u>
Filling	3.4	5134 <u>1/</u>
Air permeability (Type III only)	3.4	5450
Coating adhesion (all types)	3.4	5970
Hydrostatic resistance, water permeability (Types I, II, IV, V, and VII as applicable):		
Initial	3.4	5516 <u>2/</u>
After abrasion	3.4	4.5.1 <u>8/</u> & 5516 <u>2/</u>
After low temperature exposure	3.4	5874 <u>3/</u> & 5516 <u>2/</u>
After heat aging	3.4	5870 <u>4/</u> & 5515 <u>2/</u>
Hydrostatic resistance (Type VI only):		
Initial	3.4	5512
After low temperature exposure	3.4	5874 <u>5/</u> & 5512
After heat aging	3.4	5870 <u>6/</u> & 5512
Flame resistance:		
Flaming time (all types):		
Warp	3.4	5903 <u>7/</u>
Filling	3.4	5903 <u>7/</u>
Glow time (Types I, II, III, IV, V, and VII as applicable):		
Warp	3.4	5903
Filling	3.4	5903
Char length (all types):		
Warp	3.4	5903
Filling	3.4	5903
Blocking (all types)	3.4	5872
Colorfastness to (Type IV only):		
Light	3.4	5660 <u>8/</u> <u>14/</u>
Wet and dry crocking	3.4	5651
Resistance to aromatic hydrocarbons (all types)	3.4.1	4.5.2
Resistance to aliphatic hydrocarbon fluids (Type VII only)	3.4.2	4.5.3
Resistance to oil (Type VI only)	3.4.3	4.5.4
Resistance to accelerated weathering (Type VI only)	3.4.4	5804 <u>9/</u>

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Table VI - End item tests (cont'd)

Characteristic	Requirement Paragraph	Test method
Abrasion resistance:		
Types I and II	3.4.5.1	5306 <u>10/</u> & <u>11/</u>
Type III	3.4.5.2	5306 <u>10/</u>
Type V	3.4.5.3	5304 <u>12/</u>
Type VII	3.4.5.4	5306 <u>13/</u>
Corrosion (Types I, II, III, IV, V, and VII as applicable)	3.4.6	4.5.5

- 1/ Except Type I shall be a trapezoidal tear determined in accordance with Section 14 of ASTM-D-1117-77 with results reported as the average of the 5 highest peak loads of resistance (not including the original peak) registered during the separation of the tear. The tearing strength of the sample units shall be the average of the results obtained from the specimens tested in each of the warp and filling directions, and shall be reported to the nearest 1 pound.
- 2/ The water height shall be raised to 20 inches (50 cm), and maintained at that level for 10 minutes. The water shall contact the lightly coated side or uncoated side of the applicable cloth, except for the Type IV cloth which may be on either side.
- 3/ Except that the temperature shall be maintained at -20° ($\pm 4.0^{\circ}$)F ($-29^{\circ} + 2.2^{\circ}$ C) for 4 hours.
- 4/ Except that the temperature shall be maintained at 160° ($\pm 5^{\circ}$)F ($71^{\circ} + 2.8^{\circ}$ C)
- 5/ Except that the temperature shall be maintained at -40° (4.0°)F ($-40^{\circ} + 2.2^{\circ}$ C) for 4 hours.
- 6/ Except that the temperature shall be maintained at 170° ($\pm 5^{\circ}$)F ($77^{\circ} + 2.8^{\circ}$ C) for 4 hours.
- 7/ Except that the specimen shall be observed for an additional 30 seconds after burner flame turn off. If the tip of the flame passes beyond the top edge of the specimen at any time during the 42 seconds after the burner is turned on, the specimen shall be reported as a test failure. Five specimens shall be tested and the results reported individually as "pass" or "fail".
- 8/ The time of exposure to light shall be 20 standard fading hours.
- 9/ The time of exposure to accelerated weathering shall be 150 hours.
- 10/ Except that CS-17 calibrase wheels and augmenting weights to provide for a load of 1000 grams per wheel shall be used.
- 11/ The test shall be conducted on the heavier coated side.
- 12/ Except that:
- The long dimension of the specimen shall be parallel to the warp direction of the sample.
 - The tension on the specimen shall be six pounds (2.7 Kg).
 - The abrader shall be silicone-carbide cloth 240 grit.
 - The abradent shall be changed after each 250 cycles and the test continued. The wear on the coating shall be observed after 1000 cycles and test discontinued.

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- 13/ Except that CS-10 or CS-10F calibrase wheels and augmenting weights to provide for a load of 1000 grams per wheel shall be used. Five specimens per sample unit shall be tested, and shall be abraded until a visible rupture of one or more of the fibers is obtained. Test reports shall indicate the thickness of the coating on the test specimen and shall be reported to the nearest 0.0001 inch.
- 14/ The calibration of the fadeometer and the definition of AATCC Fading Units shall be according to AATCC Test Method 16-1982. Using the formula below, 16 to 22 AFU's are acceptable as 20 SFH's.

$$\text{AATCC Fading Units} = \frac{(\Delta E^*)}{1.7} (20)$$

Where (ΔE^*) is the color difference in CIELAB* units of color difference.

4.5.1 Hydrostatic resistance after abrasion. A new test specimen 10 by 10 inches (25.4 by 25.4cm), shall be taken for the test. The test specimen shall be abraded by means of a 2 inch (5.1cm) square of grade 1/0 Garnet paper, which shall be uniformly loaded with a 7.9 to 8.1 ounce (221.2 to 226.8g) weight. The test specimen shall be abraded across the center of one coated side by moving the weighted Garnet paper fillingwise back and forth 5 times in each direction. With the exception of the Type V cloth which is coated only on the face side, the reverse side of the coated cloth shall be abraded in the same manner but in the warpwise direction. Hydrostatic resistance shall then be determined in accordance with Method 5516, with the 2 inch (5.1cm) square abraded portion face up and centered in the clamps of the test apparatus.

* 4.5.2 Resistance to aromatic hydrocarbon fluid. A test specimen 4 by 4 inches (10.2 by 10.2cm), shall be immersed for 5 minutes in a mixture of 60% Isooctane and 40% Toluene. The specimen shall be allowed to dry at room temperature for 2 hours (+ 5 minutes), after which time the specimen will be visually examined for evidence of curling, stiffening and separation of the coating. The specimen shall then be folded as specified in Method 5874 and examined visually for evidence of cracking or flaking. Any evidence of any of the above conditions constitutes a defect and will be cause for rejection of the lot. One test specimen per sample unit shall be tested and the results reported as "Pass" or "Fail".

4.5.3 Resistance to aliphatic hydrocarbon fluid. A test specimen 4 by 4 inches (10.2 by 10.2cm), shall be immersed for 5 minutes in perchloroethylene conforming to 0-T-236. The specimen shall be allowed to dry at room temperature for 2 hours (+ 5 minutes), after which time the specimen will be visually examined for evidence of curling, stiffening and separation of the coating. The specimen shall then be folded as specified in Method 5874 and examined visually for evidence of cracking or flaking. Any evidence of any of the above conditions constitutes a defect, and will be cause for rejection of the lot. One test specimen per sample unit shall be tested and the results reported as "Pass" or "Fail".

4.5.4 Resistance to oil. The test apparatus shall consist of a wooden frame with inside dimensions of 6 by 6 by 1 inch (15.2 by 15.2 by 2.5cm). A test specimen 8 by 8 inches (20.3 by 20.3cm), shall be forced into the frame utilizing a wooden block 5 3/4 by 5 3/4 inches (14.6 by 14.6cm) and with the corners rounded to form a basin of uniform depth. The edges of the cloth

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shall be tacked to the wooden frame, and the wooden block removed. A lubricating oil conforming to MIL-H-5606, shall be rapidly poured into the basin to a 1/2 inch (1.3cm) depth. After the oil has been in the basin for one hour, the bottom of the fabric specimen forming the basin shall be examined to determine if oil has permeated the coated cloth to cause leakage. Any evidence of leakage constitutes a defect, and will be cause for rejection of the lot. One test specimen per sample unit shall be tested, and the results reported as "Pass" or "Fail".

4.5.5 Corrosion. A test specimen 1/2 inch by 6 inches (1.3 by 15.2cm) of the applicable coated cloth, shall be wound spirally around a polished 1/2 inch (1.3cm) 24ST aluminum tube. The tube and cloth shall be placed in a humidity chamber at 125 (+ 5) °F (57 (+ 2.8) °C) and a relative humidity of 97 to 100 percent for 48 hours. Any evidence of corrosion, but not discoloration of the aluminum will be cause for rejection of the lot. One test specimen per sample unit shall be tested, and the results reported as "Pass" or "Fail".

5. PACKAGING

5.1. Put up and preservation. Put up and preservation packaging shall be level A or Commercial as specified (see 6.2 and 6.2.1).

5.1.1 Levels A and Commercial. The coated cloth, put up as specified in 3.7, shall be packaged in accordance with the applicable requirements of PPP-P-1136.

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

5.2.1 Levels A, B and Commercial. The coated cloth shall be packed in accordance with the applicable requirements of PPP-P-1136.

5.3 Marking. In addition to any special marking required by the contract or order, shipments shall be marked in accordance with the applicable requirements of PPP-P-1136.

6. NOTES

6.1 Intended use. The coated cloths covered by this specification are intended for use in aircraft insulation, acoustical and sound proofing blankets, warning streamers, aircraft flooring, aircraft decorative interior finish trim, and as covering for detachable compartments.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. Type required (see 1.2).
- c. When a first article inspection is required (see 3.2), the item will be tested and should be a first article sample. The contracting officer should include specific instructions in acquisition documents regarding arrangement for examinations, quantity and testing and approval.
- d. Color(s) required (see 3.5).
- e. Width of cloth required (see 3.8).

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f. Selection of the applicable levels of packaging and packing (see 5.1 and 5.2).

6.2.1 In the preparation of contracts or orders, it must be noted that various options, choices, and alternatives as indicated in PPP-P-1136, may be exercised in the preparation for delivery of the cloth.

6.3 Standard sample. For access to the standard sample, address the procuring activity issuing the invitation for bids.

6.4 Marginal notations. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

* 6.5 Subject Term (Key Word) listing.

Nonporous
Flame Resistant
Fluorescent
Fuel Resistant
Oil Resistant
Porous

Custodian:
Navy - NU
Air Force - 99

Preparing Activity:
Navy - NU

Review Activity:
Air Force - 11, 82
DLA-CT

Project No. 8305-0922

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