

MIL-C-10799H  
29 March 1983  

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SUPERSEDING  
MIL-C-10799G  
15 September 1970

MILITARY SPECIFICATION

CLOTH, COATED, COTTON, VINYL COATED, FIRE AND MILDEW RESISTANT

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

1. SCOPE

1.1 Scope. This document covers the requirements for waterproof, fire and mildew resistant, vinyl-coated cotton cloth (see 6.1).

1.2 Classification. Vinyl-coated cotton cloth shall be of the following types and classes (see 6.2).

Type I Coated cloth

- Class 1 - Plain weave 7.0 to 8.5 ounces (both sides coated).
- Class 3 - Twill weave 14.0 to 16.0 ounces (one side coated).

Type II Coated duck (both sides coated)

- Class 1 - Army duck, cotton plied yarns, 15.5 to 18.5 ounces.
- Class 3 - Army duck, cotton plied yarns, 12.0 to 15.0 ounces.
- Class 4 - Army duck, cotton plied yarns, 18.0 to 21.0 ounces.
- Class 5 - Army duck, cotton plied yarns, 22.0 to 25.0 ounces.

Beneficial comments ( recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Natick Research and Development Laboratories, Natick, MA 01760 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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## 2. APPLICABLE DOCUMENTS

- \* 2.1 Government documents. Unless otherwise specified, the following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this document to the extent specified herein.

## SPECIFICATIONS

## FEDERAL

- TT-S-735 - Standard Test Fluids; hydrocarbon  
 CCC-C-419 - Cloth, Duck, Cotton, Unbleached, Plied-Yarns Army  
 and Numbered  
 CCC-D-950 - Dyeing and Aftertreating Processes for Cotton Cloths  
 PPP-P-1136 - Packaging and Packing of Coated (Plastic; Rubber)  
 and Laminated Fabrics

## MILITARY

- MIL-C-5646 - Cloth, Airplane  
 MIL-L-6082 - Lubricating Oil: Aircraft Reciprocating Engine (Piston)  
 MIL-P-8184 - Plastic Sheet, Acrylic, Modified

## STANDARDS

## FEDERAL

- FED-STD-191 - Textile Test Methods  
 FED-STD-406 - Plastics: Methods of Testing  
 FED-STD-595 - Colors  
 FED-STD-601 - Rubber: Sampling and Testing

## MILITARY

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

(Copies of documents required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

- \* 2.2 Other publications. Unless otherwise specified, the following documents or the issue in effect on date of invitation for bids or request for proposal, form a part of this document to the extent specified herein.

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 1424 - Tear Resistance of Woven Fabrics by Falling-Pendulum  
(Elmendorf) Apparatus

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

- \* (Technical society and technical association documents 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 document and the references cited herein, the text of this document shall take precedence.

3. REQUIREMENTS

- \* 3.1 Laboratory report approval. Unless otherwise specified (see 6.2) at the time of submission of a bid, the bidder shall submit to the contracting officer a certified copy of a recent laboratory report covering material which he proposes to deliver. Unless otherwise specified by the contracting officer, the bidder shall certify that the coated cloth was manufactured in a plant where the coating will be performed if a contract is awarded. This laboratory report shall contain test data which demonstrate that the finished product which the bidder proposes to deliver has been tested in conformance with and found to comply with the requirements of this document. Any of the following types of reports shall be satisfactory from the standpoint of this requirement.
  - (a) An independent or commercial laboratory report.
  - (b) The prospective contractor's own laboratory report.
  - (c) A governmental laboratory report from a contract within six months of date of submission of bid.

The purpose of the above requirement is to assist the Government to determine the capability of bidders to manufacture a cloth meeting all the requirements of this document. The submission of an acceptable report under this requirement shall not be construed as relieving a contractor from subsequently meeting all requirements of the document on all deliveries.

3.2 Standard sample. The coated cloth 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 6.2 and 6.3).

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3.3 Materials.

3.3.1 Base cloths. All base cloths (except type I, class 3) prior to mildew treatment shall contain not more than 2.5 percent starch and protein and not more than 5.0 percent total size, finishing and nonfibrous materials, including starch and protein when determined as specified in 4.2.1. The base cloths for the specified types and classes of coated cloth shall be as outlined below:

| <u>Coated cloth</u><br><u>type</u> <u>class</u> | <u>Base cloth</u><br><u>weight oz/sq. yard</u> | <u>Applicable base cloth</u><br><u>document</u> |
|-------------------------------------------------|------------------------------------------------|-------------------------------------------------|
| I        1                                      | 4.0 - 4.5                                      | MIL-C-5646 <u>1/</u>                            |
| II       1                                      | 9.85                                           | CCC-C-419, type III                             |
| II       3                                      | 8.25                                           | CCC-C-419, type III                             |
| II       4                                      | 12.29                                          | CCC-C-419, type III                             |
| II       5                                      | 14.77                                          | CCC-C-419, type III                             |

1/ Except that mercerization is not required.

The base cloth for type I, class 3 coated cloth shall be a greige undyed cotton cloth. The cloth shall be napped on one side only and shall conform to the following physical requirements:

|                                      |         |     |
|--------------------------------------|---------|-----|
| Weight, ounces/square yard (minimum) |         | 8.5 |
| Yarns per inch (minimum)             | Warp    | 76  |
|                                      | Filling | 48  |
| Breaking strength, lbs. (minimum)    |         |     |
|                                      | Warp    | 130 |
|                                      | Filling | 75  |

\* 3.3.2 Mildew treatment (not applicable to type I, class 3 cloth). The type I, class 1 and all type II coated cloth shall contain a mildew inhibitor applied either to the base cloth as specified in 3.3.2.1 or to the coating compound as specified in 3.3.2.2. The contractor shall specify in his bid whether the inhibitor will be added to the base cloth or to the coating compound and the inhibitor to be used. The contractor shall make no change in these options without approval of the contracting officer.

\* 3.3.2.1 Base cloth mildew treatment. When the base cloth is mildew resistant treated, the treatment shall conform to class D of CCC-D-950 using inhibitor (d). When the color is to be other than olive drab, either inhibitor (a) or inhibitor (d) may be used.

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- \* 3.3.2.2 Coating compound mildew treatment. When the coating compound is mildew resistant treated, the mildew inhibitor shall be copper-8-quinolinolate in solubilized form. The inhibitor shall be added to the coating compound in such quantity that the metallic copper content in the coating of the finished coated cloth will be 0.18 to 0.27 percent when tested as specified in 4.2.4.

3.3.3 Coating compound.3.3.3.1 Applicable to type I, class 1 and all type II cloths.

3.3.3.1.1 For olive drab shades. The coating compound shall be formulated from virgin vinyl chloride polymer or virgin vinyl chloride acetate copolymer. Neither fungicides nor flame inhibitors containing mercurial compounds nor water soluble ingredients shall be used (see 6.4).

3.3.3.1.2 For shades other than olive drab. The coating compound for shades other than olive drab shall conform to the requirements of 3.3.3.1.1. Only phosphate or phtalate ester plasticizers shall be used when the base cloth is treated with inhibitor (a) specified in CCC-D-950.

3.3.3.2 Applicable to type I, class 3 cloths only. The coating compound shall be a vinyl resin suitably compounded and pigmented to meet the requirements of this document.

3.4 Coated cloth.

3.4.1 Type I, class 1 and all type II cloths. The coating compound specified in 3.3.3.1 shall be applied to both sides of the base cloth at a rate to meet overall weight requirements specified in table I. One side of the cloth shall be just sufficiently coated to meet the resistance to water absorption requirement and the balance of the coating shall be applied to the other side. Calender coating with a preformed film shall not be permitted. Unless otherwise specified, the heavily coated side shall be the face.

3.4.2 Type I, class 3. The coating compound specified in 3.3.3.2 shall be applied only to the unnaped side of the cloth.

- \* 3.5 Physical properties. The physical properties for the types and classes of coated cloth shall conform to the requirements specified in table I and 3.5.1 through 3.5.7, when tested as specified in 4.2.4.

TABLE I. Physical properties of coated cloth

|                                 | Type I  |         | Type II |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|
|                                 | Class 1 | Class 3 | Class 1 | Class 3 | Class 4 | Class 5 |
| Overall weight<br>(oz./sq.yd.): |         |         |         |         |         |         |
| Minimum                         | 7.0     | 14.0    | 15.5    | 12.0    | 18.0    | 22.0    |
| Maximum                         | 8.5     | 16.0    | 18.5    | 15.0    | 21.0    | 25.0    |

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TABLE I. Physical properties of coated cloth (cont'd)

|                                                              | Type I  |         | Type II |         |         |         |
|--------------------------------------------------------------|---------|---------|---------|---------|---------|---------|
|                                                              | Class 1 | Class 3 | Class 1 | Class 3 | Class 4 | Class 5 |
| Breaking strength,<br>pounds (minimum)                       |         |         |         |         |         |         |
| Initial:                                                     |         |         |         |         |         |         |
| Warp                                                         | 80      | 130     | 160     | 125     | 210     | 235     |
| Filling                                                      | 80      | 75      | 110     | 120     | 130     | 175     |
| After accelerated<br>weathering:                             |         |         |         |         |         |         |
| Warp                                                         | 72      | 117     | 112     | 88      | 147     | 165     |
| Filling                                                      | 72      | 66      | 77      | 84      | 91      | 123     |
| Tearing strength,<br>(minimum)                               |         |         |         |         |         |         |
| Elmendorf (grams):                                           |         |         |         |         |         |         |
| Warp                                                         | -       | -       | 2400    | -       | -       | -       |
| Filling                                                      | -       | -       | 1900    | -       | -       | -       |
| Tongue method,<br>(pounds):                                  |         |         |         |         |         |         |
| Warp                                                         | 2.0     | 6.0     | -       | 3.0     | 5.0     | 5.0     |
| Filling                                                      | 2.0     | 6.0     | -       | 3.0     | 5.0     | 5.0     |
| Stiffness, centimeters,<br>(maximum) (warp only):            |         |         |         |         |         |         |
| At 70°F                                                      | -       | -       | 13.0    | -       | -       | -       |
| At -40°F                                                     | -       | -       | 16.0    | -       | -       | -       |
| Adhesion of coating,<br>pounds per 2-inch<br>width (minimum) |         |         |         |         |         |         |
|                                                              | 6.0     | 6.0     | 6.0     | 6.0     | 8.0     | 8.0     |
| Blocking, scale rating,<br>(maximum)                         |         |         |         |         |         |         |
|                                                              | (2)     | (3)     | (3)     | (3)     | (3)     | (3)     |
| Resistance to water<br>absorption, percent,<br>(maximum)     |         |         |         |         |         |         |
|                                                              | -       | -       | 5.0     | 5.0     | 5.0     | 5.0     |
| Crocking, dry and wet                                        |         |         |         |         |         |         |
|                                                              | -       | -       | Good    | -       | -       | -       |

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**3.5.1 Hydrostatic resistance (applicable to all types and classes).**

3.5.1.1 Initial. The coated cloth shall show no signs of leakage when tested as specified in 4.2.4. Leakage is defined as the appearance of water at three or more different places in the test area.

3.5.1.2 After abrasion. No more than 5 mL of water shall seep through the abraded portion when tested as specified in 4.2.4.

3.5.2 Flame resistance (applicable to only type II cloths). The cloth shall be tested in both the warp and filling directions for flame resistance in the original condition and after weatherometer exposure. The maximum after-flame time shall be 2.0 seconds and the maximum char length shall be 3.5 inches when tested as specified in 4.2.4.

3.5.3 Resistance to cold crack (applicable to all types and classes). The coated cloth shall show no cracking, flaking or separation of coating from the cloth when exposed to low temperature, when tested as specified in 4.2.4.

3.5.4 Aromatic hydrocarbon resistance (applicable to all types and classes). After immersion in aromatic fuel, the coated cloths shall show no cracking, flaking, or separation of the coating from the cloth and when subjected to a static head of 20 inches of water for 10 minutes, the seepage of water shall not exceed 5 mL through the 4-1/2 inch diameter test area, when tested as specified in 4.2.4.

3.5.5 Oil resistance (applicable to only type II cloths). The cloth shall show no evidence of seepage of oil through the material when tested as specified in 4.2.4.

3.5.6 Resistance to accelerated weathering (applicable to all types and classes). After weatherometer exposure, the coated cloth shall show no cracking or crazing when folded sharply on itself. The color of the coated cloth shall not be appreciably changed when compared to an unexposed specimen of the same sample unit. "Appreciably" means a change that is immediately noticeable in comparing the tested specimen with the original.

3.5.7 Crazing and discoloration (applicable to only type I, class 3 cloth). The cloth shall not contain any materials or impurities which will cause crazing or discoloration of transparent molded plastic sheet when tested as specified in 4.2.4.

3.6 Color (applicable to all types and classes). The color shall match the applicable color number of FED-STD-595 or shall match the approved color standard for the color specified (see 6.2) where such a standard is applicable.

3.6.1 Aluminized coating. Aluminized coating, when required (see 6.2), shall contain sufficient aluminized pigment to produce a bright reflecting surface equal to the standard sample.

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- \* 3.6.2 Matching. The color and shade shall match the standard sample (see 6.2), under artificial daylight having a color temperature of  $7000 \pm 500$  K and shall be a good approximation to the standard sample under incandescent lamplight at  $2850 \pm 100$  K.

3.7 Width. The minimum overall width shall be as specified (see 6.2). It is permissible to trim the edges of the coated cloth provided the minimum width of the finished coated cloth is maintained.

3.8 Length and put-up. Coated cloth shall be put up in rolls as specified in PPP-P-1136. The minimum length of rolls shall be 60 yards. The maximum number of pieces per roll shall be three and no single piece shall be less than 20 yards.

3.9 Workmanship. The finished cloth shall conform to the quality of product established by this document. 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 or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the document where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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

- \* 4.2 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

- \* 4.2.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this document or applicable purchase document. In addition, testing shall be performed for the characteristics specified in table II. All test reports shall contain the individual values utilized in expressing the final result. The sample unit shall be 1/2 yard full width of the desired base cloth, and 1/2 yard full width of the mildew proofed base cloth, (if applicable). The lot size shall be expressed in units of 1 yard and the sample size shall be as specified below. The lot shall be unacceptable if one or more sample units fail to meet any requirement specified. For mildew inhibitor characteristics, the test report shall indicate whether the inhibitor was added to the base cloth or coating compound.

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| <u>Lot size (yards)</u>        | <u>Sample size (sample units)</u> |
|--------------------------------|-----------------------------------|
| 800 or less                    | 2                                 |
| 801 up to and including 22,000 | 3                                 |
| 22,001 and more                | 5                                 |

TABLE II. Component tests

| <u>Component</u> | <u>Characteristic</u>                                | <u>Requirement reference</u> | <u>FED-STD-191 test method</u> |
|------------------|------------------------------------------------------|------------------------------|--------------------------------|
| Base cloth       | Nonfibrous materials content of all base cloths      | 3.3.1                        | 2611                           |
|                  | Type I, class 3 cloth:                               |                              |                                |
|                  | Weight                                               | 3.3.1                        | 5041                           |
|                  | Yarns per inch                                       | 3.3.1                        | 5050                           |
|                  | Breaking strength                                    | 3.3.1                        | 5100                           |
|                  | Mildew inhibitor content                             | 3.3.2.1                      | <u>1/</u>                      |
|                  | Coating compound:                                    |                              |                                |
|                  | For all types and classes other than type I, class 3 | 3.3.3.1                      | <u>2/</u>                      |
|                  | For type I, class 3                                  | 3.3.3.2                      | <u>3/</u>                      |

1/ Inhibitor test shall be as specified in CCC-D-950.

2/ A certificate of compliance shall be furnished with each shipment or lot specifying the following:

- (a) The coating is formulated from virgin vinyl chloride polymer or virgin vinyl chloride acetate copolymer.
- (b) No mercurial compounds or water soluble ingredients have been used in the coating.
- (c) When inhibitor (a) is added to the base cloth, the coating is plasticized exclusively with phthalate or phosphate esters.

3/ A certificate of compliance shall be furnished with each shipment or lot stating that the coating is vinyl resin.

4.2.2 In-process inspection. Inspection shall be made at any point or during any phase of the processing to assure that coating is not calendered on with a preformed coating (see 3.4.1). The Government reserves the right to exclude from consideration for acceptance any material or service for which in-process inspection has indicated nonconformance.

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4.2.3 End item examination.

- \* 4.2.3.1 Yard-by-yard examination. The cloth shall be examined for the defects listed below. The required yardage of each roll in the sample shall be examined on one side only, however, the side shall be alternated for every other roll examined. The same yardage shall be given a through-light inspection for pinholes and thinly coated areas. The through-light inspection shall be performed 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. A continuous defect shall be counted as one defect for each warpwise yard or fraction thereof in which it occurs. The sample unit shall be 1 linear yard. The inspection level shall be I and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 2.5 for major defects and 6.5 for total (major and minor combined) defects. The number of rolls from which the sample is to be selected shall be in accordance with table III. An approximately equal number of yards shall be examined in each roll sampled.

| *Defect                                                                                                          | Classification |       |
|------------------------------------------------------------------------------------------------------------------|----------------|-------|
|                                                                                                                  | Major          | Minor |
| Any cut, hole, tear, scratch, or abrasion mark that results in baring the base cloth.                            | X              |       |
| Any surface scratch or abrasion mark that does not result in baring the base cloth.                              |                | X     |
| Any pinhole.                                                                                                     | X              |       |
| Any uncoated area.                                                                                               | X              |       |
| Any pit, blister, foreign matter, tunnel, or delamination of coating.                                            | X              |       |
| Any lump or heavily coated area.                                                                                 |                | X     |
| Any crease or wrinkle resulting in doubling or adhesion of surfaces that cannot be corrected by manual pressure. | X              |       |
| Uneven coating, thin area where coating is missing or noticeably thinner.                                        | X              |       |
| Any light area or window resulting from improper distribution of pigment.                                        |                | X     |
| Edges heavily beaded, cannot be rolled in uniform layers.                                                        | X              |       |
| Any edge not straight or not trimmed off uniformly.                                                              |                | X     |
| Fabric edges rolled, curled, folded, doubled, scalloped, or wavy precluding a flat lay of the cloth.             | X              |       |
| Any spot, stain, or streak more than 1 inch in combined directions. <u>1/</u>                                    | X              |       |
| Trimmed width less than minimum specified.                                                                       | X              |       |
| Any objectionable odor. <u>2/</u>                                                                                |                | X     |
| Color and shade not as specified.                                                                                |                | X     |
| Shade not uniform.                                                                                               |                | X     |
| Any tackiness (coating will adhere and not unroll readily).                                                      | X              |       |
| Reflecting surface not equal to standard when aluminized coating is specified.                                   |                | X     |
| Any ripples, waviness, or dimensional distortion.                                                                |                | X     |
| Not clean.                                                                                                       |                | X     |

1/ Clearly visible at normal inspection distance (approximately 3 feet).

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- 2/ Odors of chemicals commonly used in coating compounds shall not be regarded as objectionable.

TABLE III. Examination criteria

| Lot size<br>(yards)                | Sample size<br>(rolls) | Maximum number of<br>defects acceptable<br>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 a lot contains fewer than three rolls, each roll in the lot shall be examined.

- 2/ Applicable to length examination only (see 4.2.3.2.1).

#### 4.2.3.2 Length examination.

4.2.3.2.1 Examination for length in individual roll. Each individual roll in the sample shall be examined for the defects listed below. If the total number of defects in the sample rolls exceed the maximum number specified in table III, the lot shall be rejected.

Any roll containing more than three pieces.  
 Any piece in roll less than 20 yards in length.  
 Any roll with a total length of less than 60 yards.  
 Any roll with a total length more than 2 yards less than that marked on ticket.

4.2.3.2.2 Total yardage in sample. The rolls examined shall be those selected for examination of individual rolls as specified in 4.2.3.2.1. The lot shall be unacceptable if the total of the actual gross lengths of the rolls in the sample is less than the total gross lengths marked on the roll tickets.

- \* 4.2.4 End item testing. The coated cloth shall be tested for the characteristics listed in table IV. The methods of testing specified in FED-STD-191, whenever applicable and as listed in table IV, shall be followed. The physical values specified in section 3 apply to the average of determinations made on a sample unit for test purposes as specified in the applicable test method. The sample unit for testing shall be 5 continuous yards full width of the coated cloth. The lot size shall be expressed in units of 1 linear yard and the sample size (number of sample units) shall be as specified below. The lot shall be unacceptable if any sample unit fails to meet any requirement specified. For those characteristics where test results are reported as "pass" or "fail" and for the blocking tests, each determination made shall be reported and there shall be no evidence of failure of any test specimen to meet the requirements as specified. All test reports shall contain the individual values used in expressing the final results.

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| <u>Lot size (yards)</u> | <u>Sample size (sample units)</u> |
|-------------------------|-----------------------------------|
| 800 or less             | 2'                                |
| 801 to 22,000           | 3                                 |
| 22,001 and over         | 5                                 |

4.2.4.1 Standard test conditions. Results of physical tests obtained under testing conditions defined in FED-STD-191, FED-STD-406, or FED-STD-601 will be acceptable except in cases of dispute. In dispute cases, tests shall be conducted with both the specimen and test apparatus under standard conditions as defined in FED-STD-191.

TABLE IV. End item tests

| <u>Characteristic</u>                                                                      | <u>Requirement paragraph</u> | <u>Test method</u>    |
|--------------------------------------------------------------------------------------------|------------------------------|-----------------------|
| Mildew inhibitor content:<br>For copper-8-quinolinolate when<br>added to coating <u>1/</u> | 3.3.2.2                      | 4.3.1 <u>2/</u>       |
| Overall weight                                                                             | 3.5                          | 5041                  |
| Breaking strength:                                                                         |                              |                       |
| Initial                                                                                    | 3.5                          | 5100                  |
| After accelerated weathering                                                               | 3.5                          | 4.3.2 and 5100        |
| Tearing strength:                                                                          |                              |                       |
| Type II, class 1                                                                           | 3.5                          | ASTM D 1424 <u>3/</u> |
| All other types and classes                                                                | 3.5                          | 5134                  |
| Stiffness (type II, class 1 only):                                                         |                              |                       |
| At 70° <u>±</u> 2°F and at -40° <u>±</u> 2°F                                               | 3.5                          | 5204 <u>4/</u>        |
| Adhesion of coating                                                                        | 3.5                          | 5970                  |
| Blocking                                                                                   | 3.5                          | 5872                  |
| Resistance to water absorption<br>(type II only)                                           | 3.5                          | 5504                  |
| Crocking (type II, class 1 only)                                                           | 3.5                          | 5651                  |
| Hydrostatic resistance:                                                                    |                              |                       |
| Initial                                                                                    | 3.5.1.1                      | 4.3.3.1               |
| After abrasion                                                                             | 3.5.1.2                      | 4.3.3.2               |
| Flame resistance (type II only):                                                           |                              |                       |
| Initial:                                                                                   |                              |                       |
| After-flame time and char length                                                           | 3.5.2                        | 5903                  |
| After accelerated weathering:                                                              |                              |                       |
| After-flame time and char length                                                           | 3.5.2                        | 4.3.2 and 5903        |
| Resistance to cold crack at -40°F:                                                         |                              |                       |
| Type II, class 1                                                                           | 3.5.3                        | 5874 <u>5/</u>        |
| All other types and classes                                                                | 3.5.3                        | 4.3.4                 |
| Aromatic hydrocarbon resistance                                                            | 3.5.4                        | 4.3.5                 |
| Oil resistance (type II only)                                                              | 3.5.5                        | 4.3.6                 |
| Resistance to accelerated weathering                                                       | 3.5.6                        | 4.3.2 <u>5/</u>       |
| Crazing and discoloration (type I,<br>class 3 only)                                        | 3.5.7                        | 4.3.7                 |

1/ A certificate of compliance shall be furnished specifying that the solubilized form of copper-8-quinolinolate has been used.

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- 2/ In any event, a statement of the test report shall show the type of inhibitor applied and whether it was added to the base cloth or to the coating.
- 3/ The standard instrument shall be used, with one NBS augmenting weight.
- 4/ Specimens for stiffness test at both 70°F and -40°F shall be conditioned at the test condition for not less than 4 hours prior to the test.
- 5/ Make one determination per sample unit and report the results as "pass" or "fail".
- \* 4.2.5 Preparation for delivery inspection. The inspection of preparation for delivery shall be in accordance with the quality assurance provisions of PPP-P-1136.

4.3 Methods of inspection.

4.3.1 Analysis of copper-8-quinolinolate added to the coating compound. When the mildew inhibitor is added to the coating compound, the coated cloth shall be analyzed for metallic copper content according to Method 2050 of FED-STD-191, except that the specimen shall be 5 grams and that the results of the analysis shall be expressed as follows:

$$\text{Copper content, percent} = \frac{\text{Wt. copper deposit, grams} \times 100}{A \times \frac{B - C}{B}}$$

Where A = Sample weight (coated cloth)  
 B = Weight, oz./sq. yd. (coated cloth)  
 C = Lot average weight, oz./sq. yd. (base cloth)

4.3.2 Weathering procedure. The test shall be performed with filters for a period of 150 hours on specimens 4 by 6 inches minimum with the heavily coated side of the cloth exposed as specified in Method 5804 of FED-STD-191. After exposure, the specimens shall be allowed to dry and then be conditioned at standard conditions for 4 hours before testing.

4.3.3 Hydrostatic resistance test.

- \* 4.3.3.1 Initial. A specimen, 8 by 8 inches shall be taken for test. The heavier side of the coated cloth shall be placed face down so that water contacts the lightly coated or uncoated side, as applicable. The water height shall be raised to 20 inches and maintained at that level for 10 minutes as specified in Method 5516 of FED-STD-191 and then examined for leakage. Three specimens shall be tested per sample unit and results shall be reported as pass or fail.

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- \* 4.3.3.2 After abrasion. A specimen, 10 by 10 inches shall be taken for test. The specimen shall be abraded by means of a 2-inch square piece of grade 1/C Garnet paper, which shall be uniformly loaded with an  $8 \pm 0.1$  ounce weight. The specimen shall be abraded on the heavily coated side by moving the weighted Garnet paper filling-wise five times in each direction. The abraded area shall then be positioned downward across the centerline of the hydrostatic tester specified in Method 5516 of FED-STD-191. The water height shall be raised to 20 inches and maintained at that level for 10 minutes. If more than 5 mL of water passes through the abraded areas, the sample shall be reported as failing. Three specimens shall be tested per sample unit and results shall be reported as pass or fail.
- \* 4.3.4 Cold crack test (type I, classes 1 and 3; type II, classes 3, 4 and 5). A 1 by 4-inch specimen with the long direction warpwise and a 1 by 4-inch specimen with the long dimension fillingwise shall be exposed for 4 hours at a temperature of minus  $40 \pm 2^\circ\text{F}$ , and then bent sharply, face out, over a 1/8-inch diameter mandrel so that the back of the specimen touches within 1/8-inch distance directly behind the rod. The specimen shall be examined visually for evidence of cracking, flaking, or separating of the coating from the cloth.
- 4.3.5 Aromatic hydrocarbon resistance test. A sample 8 by 8 inches shall be immersed for 5 minutes in 40 percent aromatic fuel. The composition of the fuel shall conform to type II of TT-S-735. The sample shall be allowed to dry at room temperature for 2 hours  $\pm$  5 minutes, and then shall be creased at room temperature as specified in Method 5874 of FED-STD-191. The sample shall be examined visually. Any cracking, flaking, or separation of coating from the cloth shall be cause for rejection. The specimen shall then be tested as specified in Method 5516 of FED-STD-191 with the creased area positioned downward to form the centerline of the 4-1/2 inch diameter test area. The water height shall be raised to 20 inches and maintained at that level for 10 minutes.
- 4.3.6 Oil resistance test. Lubricating oil, conforming to grade 1100 of MIL-L-6082 shall be held in a pocket of coated cloth at a depth of 1/2 inch for 1 hour. Examine outside of pocket for evidence of seepage of oil.
- 4.3.7 Test for crazing and discoloring of plastics. Test apparatus consisting of a suitable type of compression test device having top and bottom steel plates spaced 6 inches apart vertically shall be used. Four specimens of plexiglass, specified in MIL-P-8184, 6-1/8 inches long and 1-1/2 inches wide shall be cut from approximately 5/32-inch thick stock. Three specimens of the finished cloth shall be cut the same length and width and placed on one side of each of three plexiglass specimens and secured at each end with pressure sensitive tape. The test specimens shall then be placed vertically between the ridged steel plates so that tension stresses are created on the surface of the plexiglass next to the napped back of the cloth. A control specimen, consisting of one piece of plexiglass without cloth attached shall be placed in a similar apparatus at least 36 inches from the other three specimens. Test specimens shall be left in this manner for a period of 72 hours in an atmosphere of  $70 \pm 2^\circ\text{F}$  and relative humidity of  $65 \pm 2$  percent. At the end of this time, specimens shall be compared visually with the control specimen and shall not show greater crazing or discoloration than the control specimen.

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## 5. PREPARATION FOR DELIVERY

5.1 Put-up and packaging. Packaging shall be level A or C as specified (see 6.2).

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

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

5.2.1 Levels A, B, and C. 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 purchase order, interior packages and shipping containers shall be marked in accordance with PPP-P-1136.

## 6. NOTES

6.1 Intended use. (See 1.2).

6.1.1 Type I cloths. Type I cloths of this document are intended for use in the manufacture of the following:

Class 1 - Airplane wing covers, engine covers and shelters.

Class 3 - Covers for molded plastic parts such as aircraft turrets, canopies and equipage items.

6.1.2 Type II cloths. Type II cloths of this document are intended for use in the manufacture of the following:

Class 1 - Insulated frame type tents. This cloth is not suitable for use in the manufacture of luggage.

Classes 3, 4  
and 5 - Recognition panels; covers where water, oil and gasoline-proof material is required; carrying cases for life rafts; life raft equipment and similar items.

6.1.3 Use warning. The cloths are not intended for use in wearing apparel or other items which may come into frequent or prolonged intimate contact with the skin.

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\* 6.2 Ordering data. Acquisition documents should specify the following:

- (a) Title, number, and date of this document.
- (b) Type and class required (see 1.2).
- (c) Whether laboratory report is not required (see 3.1).
- (d) Color and standard sample required (see 3.2 and 3.6).
- (e) When aluminized coating is required (see 3.6.1).
- (f) Width required (see 3.7).
- (g) Selection of applicable levels of put-up, packaging and packing (see 5.1 and 5.2).

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

6.4 Coating compound. The coating limitations are intended to assure a water-proof cloth with adequate resistance to mildew and bacterial degradation except for type I, class 3 cloth.

6.5 Changes from previous issue. The margins of this document 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 previous issue.

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## Preparing activity:

Army - GL  
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## Review activities:

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DLA - CT

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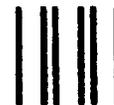
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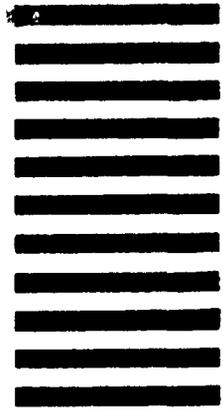


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(See Instructions - Reverse Side)

|                                                               |  |                                                         |  |
|---------------------------------------------------------------|--|---------------------------------------------------------|--|
| 1. DOCUMENT NUMBER                                            |  | 2. DOCUMENT TITLE                                       |  |
| 3a. NAME OF SUBMITTING ORGANIZATION                           |  | 4. TYPE OF ORGANIZATION (Mark one)                      |  |
| b. ADDRESS (Street, City, State, ZIP Code)                    |  | <input type="checkbox"/> VENDOR                         |  |
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| 5. PROBLEM AREAS                                              |  |                                                         |  |
| a. Paragraph Number and Wording.                              |  |                                                         |  |
| b. Recommended Wording                                        |  |                                                         |  |
| c. Reason/Rationale for Recommendation                        |  |                                                         |  |
| 6. REMARKS                                                    |  |                                                         |  |
| 7a. NAME OF SUBMITTER (Last, First, MI) - Optional            |  | b. WORK TELEPHONE NUMBER (Include Area Code) - Optional |  |
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