

DETAIL SPECIFICATION  
CAP, COLD WEATHER

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

1. SCOPE

1.1 Scope. This specification covers a fully lined and insulated cold weather cap.

1.2 Classification. The cold weather cap is available in one type and the following classes and sizes, as specified (see 6.2).

1.2.1 Type.

Type I – Cold weather cap with full ear extension flaps

1.2.2 Classes.

Class 1 – Coyote 498

Class 2 – Olive Drab Green 522

Class 3 – White 506

1.2.3 Schedule of sizes.

Small

Medium

Large

Extra Large

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

COMMERCIAL ITEM DESCRIPTIONS

A-A-50199 - Thread, Polyester Core, Cotton or Polyester-Covered

A-A-52095 - Thread, Polyester Textured

Comments, suggestions, or questions on this document should be addressed to Marine Corps Systems Command, 2200 Lester Street, Quantico, VA 22134 ATTN: SEAL-SE-STDS or emailed to [USMC\\_STDZ@usmc.mil](mailto:USMC_STDZ@usmc.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

MIL-DTL-MC027  
DRAFT DATED 8 DECEMBER 2021

A-A-55126 - Fastener Tapes, Hook and Loop, Synthetic

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-W-5664 - Webbing, Textile, Elastic

MIL-DTL-32075 - Label: For Clothing, Equipage, and Tentage, (General Use)

(Copies of these documents are available online at <https://quicksearch.dla.mil/>.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC EP9 - Visual Assessment of Color Difference of Textiles

AATCC TM8 - Colorfastness to Crocking: Crockmeter Method

AATCC TM16.3 - Test Method for Colorfastness to Light: Xenon-Arc

AATCC TM20A - Fiber Analysis: Quantitative

AATCC TM22 - Water Repellency: Spray Test

AATCC TM61 - Colorfastness to Laundering: Accelerated

AATCC TM79 - Absorbency of Textiles

AATCC TM135 - Dimensional Changes of Fabrics after Home Laundering

(Copies of these documents are available online at [www.aatcc.org](http://www.aatcc.org).)

AMERICAN SOCIETY FOR QUALITY (ASQ)

ASQ/ANSI Z1.4 - Sampling Procedures and Tables for Inspection by Attributes

(Copies of this document are available online at [www.asq.org](http://www.asq.org).)

ASTM INTERNATIONAL

ASTM D737 - Standard Test Method for Air Permeability of Textile Fabrics

ASTM D1424 - Standard Test Method for Tearing Strength of Fabrics by Falling-Pendulum (Elmendorf-Type) Apparatus

ASTM D1776/D1776M - Standard Practice for Conditioning and Testing Textiles

ASTM D1777 - Standard Test Method for Thickness of Textile Materials

ASTM D2594/D2594M - Standard Test Method for Stretch Properties of Knitted Fabrics Having Low Power

ASTM D3512/D3512M - Standard Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Random Tumble Pilling Tester

ASTM D3776/D3776M - Standard Test Methods for Mass Per Unit Area (Weight) of Fabric

ASTM D3787 - Standard Test Method for Bursting Strength of Textiles—Constant-Rate-of-Traversal (CRT) Ball Burst Test

ASTM D5034 - Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

- ASTM D6193 - Standard Practice for Stitches and Seams
- ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials

(Copies of these documents are available online at [www.astm.org](http://www.astm.org).)

#### CRC PRESS

Hayes, A. Wallace (editor) and Kruger, Claire L. (editor). *Hayes' Principles and Methods of Toxicology*. 2014.

(There are a number of ways through which this book may be obtained, such as online retailers, bookstores, and the public library, to name a few.)

#### SAE INTERNATIONAL

AMS-STD-595 - Colors Used in Government Procurement

(Copies of this document are available online at [www.sae.org](http://www.sae.org).)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

### 3. REQUIREMENTS

#### 3.1 Inspections.

3.1.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.3.

3.1.2 Conformance inspection. When specified (see 6.2), a sample shall be subjected to a conformance inspection in accordance with 4.4.

3.2 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

#### 3.3 Materials and components.

##### 3.3.1 Materials.

3.3.1.1 Basic material. The basic material for the cold weather cap shall be a nylon woven fabric conforming to the physical requirements specified in [table I](#) when tested as specified in 4.5.1. The color of the fabric shall be a good approximation to the specified reference standard furnished by the Government (see 6.2) for the class specified (see 1.2 and 6.2). The fabric shall have a durable water resistant (DWR) finish applied prior to being used in the fabrication of the caps. The fabric shall show no toxicity when used as intended (see 6.1) and when tested as specified in 4.5.6.

TABLE I. Basic material physical requirements.

<b>Material Characteristic</b>	<b>Requirement</b>
Construction	Plain Weave
Color <sup>1/</sup>	
Class 1	color chip 20150
Class 2	color chip 24119
Class 3	color chip 27885
Fiber content	Nylon
Weight, ounces per square yard	3.5 to 4.25
Break strength, pounds, percent elongation (minimum)	
Warp	190, 55%
Fill	200, 40%
Tear strength, pounds (minimum)	
Warp	7
Fill	6
Water repellency, rating, initial (minimum)	100
Colorfastness (minimum)	
Laundering (3 cycles)	4
Crocking	
Wet	4
Dry	4
Light, Xenon	4
Dimensional stability, percent (3 cycles) (maximum)	
Warp	3
Fill	2
Pilling, rating (minimum)	
Initial	5
After laundering (3 cycles)	5
Thickness (inches)	0.012 ±0.002
Visual shade matching	Good approximation to standard sample
FOOTNOTE:	
<sup>1/</sup> Color chips are as specified in AMS-STD-595.	

3.3.1.2 Insulation. The insulation material for the cold weather cap shall be polyester knit (see 6.5.2) with a velour/loft back and face. The color shall approximate the specified reference standard furnished by the Government (see 6.2) for the class specified. The fabric shall show no toxicity when used as intended (see 6.1) and when tested as specified in 4.5.6. The material shall conform to the requirements in [table II](#) when tested as specified in 4.5.1.

TABLE II. Insulation physical requirements.

<b>Material Characteristic</b>	<b>Requirement</b>
Construction	Velour/loft back and face
Fiber content	Polyester
Weight, ounces per square yard	6 to 8
Air permeability, cubic feet per minute (minimum)	300
Burst strength, pounds (minimum)	85
Thickness (minimum)	0.10
Moisture vapor transmission rate, grams per square meter in 24 hours (minimum)	2400
Absorbency (rating)	Intermediate
Dry time, minutes (maximum)	120 <sup>1/</sup>
Fabric stretch, percent (minimum)	
Courses	30
Wales	10
Dimensional stability, percent (maximum) (3 cycles)	
Courses	3.5
Wales	3.5
Visual shade matching	Good approximation to standard sample
FOOTNOTE: <sup>1/</sup> No more than one sample exceeding 120 minutes.	

3.3.1.3 Visor interfacing. The visor interfacing used to construct the brim shall be a multilayer non-woven interlining attached to a woven, consisting of 94 percent polyester and 6 percent cotton cloth, and shall be a white shade. The weight shall be 15±1-1/2 ounces per square yard when tested in accordance with 4.5.1. The interfacing shall be placed into the visor according to the marks on the pattern, allowing minimal gap between edge of interfacing and crown.

3.3.2 Components.

3.3.2.1 Thread. Thread for needle and bobbin (looper) shall be 100 percent textured, 2- or 3-ply, polyester thread, approximate tex size 35, conforming to A-A-52095; or 2- or 3-ply, cotton- or polyester-covered polyester-core thread, approximate tex size 35, conforming to A-A-50199. The thread shall be a good approximation of the color for the specified class.

3.3.2.2 Low profile hook and loop fastener tape. The hook and loop fastener tapes for the extended ear flaps shall conform to the requirements of A-A-55126, type III, class 6, when verified in accordance with paragraph 4.5. The width of the hook and loop shall be 1±1/8 inches for all sizes. For sizes small and medium, the cut length of the hook shall be 4±1/8 inches with a corresponding loop length of 5±1/8 inches; for sizes large and extra large, the cut length of the hook shall be 4-1/2±1/8 inches with a corresponding loop length of 5-1/2±1/8 inches. Cut edges shall be finished to ensure no raveling for the life of the cap. The color of the hook and loop shall approximate Coyote 498.

3.3.2.3 Elastic. There shall be elastic at the back of the cap (see [figure 2](#)), positioned approximately 1/4 inch above the finished seam at the neck. The elastic shall be three inches in length, secured between the shell and liner fabric with two 3/4-inch vertical bartacks at each end according to marks on the pattern, in addition to stitching sewn above and below the elastic to create a tunnel. Elastic shall be stitched so that it allows for gathering of the material and stretching when worn to enable a close fit to the user's neck. The elastic shall conform to the requirements of type II of MIL-W-5664 except that it shall be 3/4 inch wide and may be in any shade that does not show through the shell fabric.

3.3.2.4 Labels.

3.3.2.4.1 Identification and size label. The identification label shall conform to type VI, class 4 of MIL-DTL-32075. The label shall contain the item description, contract number, National Stock Number (NSN), fiber content information, contractor's name, and size. The inscription shall have a minimum font size of 10 points. The color of the label shall approximate the shade of the fabric. The inscription legibility, label, and label attachment shall last the expected life of the cap. The label shall be to the left of the center on the face side of the inner earflap piece according to marks on pattern. The label shall include the following information:

**Identification Information:**

CAP, COLD WEATHER

CONTRACT NO.:

NSN:

FIBER CONTENT:

CONTRACTOR'S NAME:

SIZE:

3.3.2.4.2 Instruction label. The instruction label shall be in accordance with type VI, class 3 of MIL-DTL-32075 and shall be attached as specified (see 6.2). The color of the label shall approximate the shade of the fabric. If available, a basic material supplier care label and hang tag may be used, but it shall contain the information listed below. The label shall be to the right of the center on the face side of the inner earflap piece according to marks on pattern. The instruction label shall include the following information:

**Instruction Information:**

Cold wash

Tumble dry low heat or air dry

Do not use fabric softeners

DO NOT BLEACH, DRY CLEAN, OR IRON

3.3.2.4.3 Barcode label. Each cap shall have a barcode label/hangtag conforming to type VIII, class 17 of MIL-DTL-32075 attached as specified (see 6.2). The bar coding element shall be a 13-digit NSN. There shall be a 12-digit Universal Product Code (UPC) number assigned for all NSNs by the contracting activity. The initials "UPC" must appear beneath the code. The barcode for NSN and UPC type shall be a medium- to high-density and shall be located so that it is completely visible on the cap when it is folded or packaged as specified and so it causes no damage to the cap.

3.4 Design. The cap shall have an outer shell, using basic material (see 3.3.1.1), composed of a three-panel crown and a short visor that can be worn in either the up or down position, with an inner earflap that lays flat against the forehead. The visor shall receive an additional topstitch at the joining seam through all inner earflap plies, to include the lining, from left edge to right edge of visor, in order to hold the inner earflap in place at the forehead when the user dons the cap; two 1/2-inch horizontal bartacks shall be sewn at both ends of the visor topstitch to secure the lining in place (see [figure 6](#)). The visor shall have interfacing and shall be finished with a quilt stitch pattern with five parallel lines of stitching  $1/4 \pm 1/16$  inches equidistant apart. The cap shall have full extension ear flaps that secure under the chin with hook and loop, and may also be worn with the ear flaps flipped up so that the hook and loop attaches at the crown of the head. When worn in this configuration, the inner ear flaps provide warmth to the user’s ears. The back of the cap shall have elastic positioned approximately 1/4 inch above the finished seam at the neck (see [figure 2](#)) to allow a snug fit and comfort for the wearer. The 3/4-inch elastic shall be three inches long and sewn between the shell and liner fabric, and secured with two 3/4-inch vertical bartacks at each end according to marks on the pattern. The inside of the crown and earflaps are lined with insulation (see 3.3.1.2) for warmth and comfort. The lining fabric in the crown shall be permanently attached to the shell but construction shall allow for the two fabrics to be separated, except at the visor and inner earflap, in order to facilitate drying. Joining seams on the outer shell crown shall be towards the wearer, and all joining seams on the crown lining shall be away from the wearer.

3.4.1 Figures. [Figures 1](#) through [6](#) are furnished for informational purposes only. To the extent an inconsistency exists between the text of this document and the figures, the text of this document shall govern.

3.5 Patterns. Standard patterns, providing a seam allowance of 3/8 inch for all seams will be furnished by the Government (see 6.2). The Government patterns shall not be altered in any way and shall only be used for cutting the contractor’s working patterns. The working patterns shall be identical to the Government patterns, except that additional notching, if needed to facilitate manufacture is permitted on the contractor’s working pattern. Minor modifications on the working patterns are permitted where necessary to accommodate the manufacturer’s processes and the use of automated equipment, provided the modifications do not alter the dimensional, serviceability, or appearance requirements cited in this document or those governed by the Government patterns.

3.5.1 Pattern parts. Cap parts shall be cut from the materials specified and in accordance with the pattern parts listed in [table III](#).

TABLE III. List of pattern parts.

Material	Pattern Part	Cut Parts
Basic material	Center Crown	1
	Side Crown	2
	Outer Earflap	1
	Visor	2
	Front Inner Earflap	1
	Back Inner Earflap	1
Lining	Center Crown Lining	1
	Side Crown Lining	2
	Outer Earflap Lining	1
Interfacing	Outer Visor Interfacing	1
Elastic	Elastic	1
Fastener tape	Hook	1
	Loop	1

3.6 Construction. The following specifics will provide caps with uniform appearance, comfort, and durability for use during all operations where the cap is prescribed. End item construction and appearance shall conform to the requirements and figures provided and the finished measurements cited (see 3.8) to maintain end item configuration.

3.6.1 Seams and stitching. The seams and stitching used shall be consistent, exhibit a uniform appearance, and conform to ASTM D6193 and the requirements for the location, stitch, and seam types listed in [table IV](#). Seam allowances shall be maintained with seams sewn so that no raw edges, runoffs, twists, pleats, puckers, or open seams result. All seams shall start and finish evenly and edges shall not unravel. Edges may be turned-in, turned-under, or serged to prevent raveling. Thread tension shall be maintained so that there is no tight, loose, or unbalanced stitching. The backside of all seams, inside of cap, shall be flat with no protruding seam allowance or raw edges that could create irritation or discomfort to the wearer. Unless otherwise specified (see 6.2), the stitches per inch shall be 10 to 14 for all seams.

TABLE IV. Seams and stitching.

Seaming Areas and Operations	Stitch Type	Seam Type
Join outer shell crown	301	SSa-1
Topstitch outer shell crown	301	LSb-1
Join outer earflap and outer earflap lining	301	SSE-2
Superimpose an elastic tunnel on the joined outer earflap by applying two parallel 4-inch-long rows of stitching spaced 1 inch apart according to the pattern	301	SSv-2
Attach elastic and secure with 3/4 inch vertical bartacks according to the pattern	Bartack	--
Attach hook and loop to earflaps – all plies	301	LSbj-1
Join front and back inner earflap	301	SSa-1
Topstitch front and back inner earflap joining seam	301	LSb-1
Join crown lining	301	SSa-1
Join front and back inner earflap to crown lining	301	SSE-2
Insert interfacing and join visor	301	SSa-1
Visor parallel topstitching	301	SSv-5
Join outer crown to assembled pieces (inner and outer earflaps and visor)	301	SSa-1
Join crown lining to assembled cap leaving a 2-inch gap along center crown seam, flip, and stitch gap closed.	301	SSc-1
Attach label to inner earflap – all plies	301	LSbj-1
Add topstitch across the top of the visor through all plies	301	LSe-1
Add two horizontal 1/2-inch bartacks at each end of visor topstitching	Bartack	--

3.6.2 Tacking and backstitching. Ends of seams and rows of stitching with 301 type stitch, when not caught in other seams or stitching, shall be securely backstitched not less than 1/4 inch. Thread breaks (all stitch types) shall be secured by stitching back of the break not less than 1/2 inch.

3.6.2.1 Bartacks. Bartacks for elastic attachment shall be 3/4 inch in length, placed vertically, with 36 to 42 stitches per tack. Bartacks to secure lining at visor topstitching shall be 1/2 inch in length, placed horizontally, with 30 to 36 stitches per tack. There shall be four bartacks per garment (see [table IV](#)).

3.7 Visual shade matching.



3.7.1 Visual shade matching. The color and appearance of the materials and components shall match the standard sample when tested in accordance with 4.6.2.

3.7.2 Color. The cap materials shall closely approximate the shade required for each class as well as comply with the associated AMS-STD-595 chip number (see [table I](#)). The visible materials and components shall meet the spectral reflectance requirements specified in paragraph 3.7.2.1.

3.7.2.1 Spectral reflectance. The finished cloth and visible components used shall meet the spectral reflectance values (in percent) for the visible, near infrared wavelength range, 600 to 860 nanometers, for the colors specified in [table V](#) as applicable when tested as specified in 4.6.1.

TABLE V. Spectral reflectance.

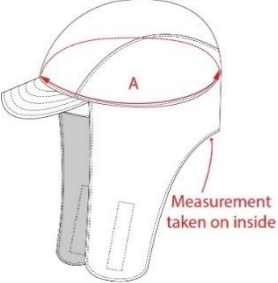
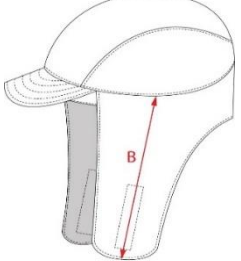
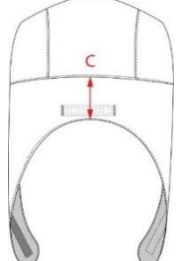
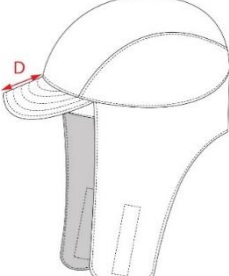
Wavelengths	Coyote 498		Olive Drab Green 522		White 506	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
600	8	20	3	9	80	98
620	8	20	3	9	80	98
640	8	22	3	9	78	98
660	8	24	3	12	78	98
680	12	24	3	16	78	98
700	12	34	5	32	78	98
720	16	42	7	44	78	98
740	22	46	12	52	78	98
760	30	50	18	56	78	98
780	34	54	26	56	78	98
800	36	56	34	56	78	98
820	38	58	42	60	78	98
840	38	58	44	60	76	99
860	40	60	44	60	76	99

3.8 Finished dimensions. The finished cap shall conform to the measurements listed in [table VI](#) as defined in [table VII](#). All measurements shall be taken in accordance with 4.5.5 with the cap laid flat. Extended flap lengths shall not be uneven by more than 1/2 inch.

TABLE VI. Finished measurements (inches).

Size and Tolerance	Inside Circumference (A)	Earflap Length (B)	Earflap Width (C)	Visor Width (D)
Small	23-1/4	10-3/4	3	1-3/4
Medium	24	11	3-1/4	1-3/4
Large	24-3/4	11-1/4	3-1/2	1-3/4
Extra Large	25-1/2	11-1/2	3-3/4	1-3/4
Tolerance	±1/2	±1/4	±1/4	±1/8

TABLE VII. Methods of measure.

Measurement (see <a href="#">table VI</a> )	Method	Layout
A - Inside Circumference	Circumference at the crown joining seam, inside the cap.	
B - Outer Earflap Length	Measurement straight from bottom of earflap at center to crown joining seam.	
C - Outer Earflap Width	Measurement at center back from finished edge to crown joining seam at crown center.	
D - Visor Width	Measurement straight from finished edge at visor center to crown joining seam.	

3.9 End item insulation. The insulation, expressed in terms of clo value, shall be a minimum of 1.1 when tested as specified in 4.5.2.

3.10 Toxicity. The cap shall not present a health hazard and shall show compatibility with prolonged direct skin contact when tested as specified in 4.5.6. Chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens shall not be used.

3.11 Workmanship. The finished cap shall be free from loose thread, foreign matter, and irregular defects that can adversely affect usage or durability. The finished cap shall conform to the requirements of this document, be uniform, and be free from the defects specified in 4.5.4 and those defects that adversely affect form, fit, or function. Defects shall not exceed the Acceptance Quality Limits (AQL), as specified (see 6.2), and shall not adversely affect the serviceability, appearance, and uniformity of the product.

#### 4. VERIFICATION

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

- a. First article inspection (see 4.3).
- b. Conformance inspection (see 4.4).

4.2 Inspection conditions. Unless otherwise specified, excluded, amended, or modified in this specification or applicable procurement documents (see 6.2), all inspections shall be performed in accordance with all the requirements of referenced documents.

4.3 First article inspection. When a first article sample is required (see 3.1.1), first article inspection shall be performed on the cap. This inspection shall include the examinations and tests of 4.5.1 through 4.5.6 for compliance with design, configuration, workmanship, dimensional requirements, and testing as specified in this document.

4.3.1 First article samples and acceptance criteria. The sample size for first article testing shall be as specified in the contract (see 6.2). The sample unit shall be one cap and the lot size shall be expressed in units of caps. The presence of excessive defects exceeding specified AQLs (see 6.2) or failure to pass any test shall be cause for rejection of the first article.

4.4 Conformance inspection. Unless otherwise specified in the contract (see 6.2), conformance inspection, in accordance with 3.1.2, shall consist of the examinations and tests through 4.5.6.

4.4.1 Material and component sampling and acceptance criteria. Unless otherwise specified in subsidiary specifications, referenced documents, or procurement documents (see 6.2), sampling shall be in accordance with [table VIII](#). The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified. All requirements are applicable to the sample unit. For material testing, the sample unit shall be 5 continuous yards full width of finished cloth for all physical and chemical tests.

TABLE VIII. Material sampling.

Lot Size	Sample Size (Sample Units)
800 or fewer	2
801 through 22,000	3
22,001 or more	5

4.4.2 End item sampling and acceptance criteria. Unless otherwise specified in the contract (see 6.2), end item sampling for inspection shall be performed conforming to ASQ/ANSI Z1.4. The sample unit shall be one cap and the lot shall be expressed in units of caps. The presence of excessive defects (see 6.2) or failure of any testing as specified (see 6.2) shall be cause for rejection of the lot.

4.5 Inspection methods.

4.5.1 Component and material examinations and tests. In accordance with 4.1, components and materials shall be inspected and tested in accordance with all the requirements of this specification and those referenced specifications and standards unless otherwise excluded, amended, or modified in this specification or applicable procurement documents (see 6.2 and 6.7). In addition to testing provisions specified in referenced documents, materials and components shall be examined and tested in accordance with [table IX](#) through [table XII](#). All requirements are applicable to the sample unit. Unless otherwise specified (see 6.2), materials shall be conditioned and tested in accordance with ASTM D1776/D1776M. All requirements are applicable to the sample unit.

TABLE IX. Component verification (see 6.7).

<b>Material</b>	<b>Requirement</b>	<b>Verification</b>
Thread	3.3.2.1	A-A-52095 or A-A-50199
Hook and loop	3.3.2.2	A-A-55126
Elastic	3.3.2.3	MIL-W-5664
Interfacing	3.3.1.3	ASTM D3776/D3776M
Identification and instruction labels	3.3.2.4	MIL-DTL-32075
Barcode label tag	3.3.2.4	MIL-DTL-32075

TABLE X. Basic material verification.

<b>Material Characteristic</b>	<b>Requirement</b>	<b>Test Method</b>
Construction	<a href="#">Table I</a>	Visual
Fiber content	<a href="#">Table I</a>	AATCC TM20A
Weight	<a href="#">Table I</a>	ASTM D3776/D3776M
Break strength	<a href="#">Table I</a>	ASTM D5034
Tear strength	<a href="#">Table I</a>	ASTM D1424
Water repellency	<a href="#">Table I</a>	AATCC TM22
Colorfastness		
Laundering (3 cycles)	<a href="#">Table I</a>	AATCC TM61, option 2A, grade polyester only
Crocking		
Wet	<a href="#">Table I</a>	AATCC TM8
Dry	<a href="#">Table I</a>	AATCC TM8
Light, Xenon	<a href="#">Table I</a>	AATCC TM16.3, option 3 (85 kJ)
Dimensional stability (3 cycles)		
Warp	<a href="#">Table I</a>	AATCC TM135, 3 cycles, (1) III, (A) ii
Fill	<a href="#">Table I</a>	AATCC TM135, 3 cycles, (1) III, (A) ii
Pilling		
Initial	<a href="#">Table I</a>	ASTM D3512/D3512M
After laundering (3 cycles)	<a href="#">Table I</a>	AATCC TM135, (1) III, (A) ii; ASTM D3512/D3512M
Thickness	<a href="#">Table I</a>	ASTM D1777
Visual shade matching	<a href="#">Table I</a>	See 4.6.2
Spectral reflectance	<a href="#">Table V</a>	See 4.6.1

TABLE XI. Insulation verification.

<b>Material Characteristic</b>	<b>Requirement</b>	<b>Test Method</b>
Construction	<a href="#">Table II</a>	Visual
Fiber content	<a href="#">Table II</a>	AATCC TM20A
Weight	<a href="#">Table II</a>	ASTM D3776/D3776M
Air permeability	<a href="#">Table II</a>	ASTM D737
Burst strength	<a href="#">Table II</a>	ASTM D3787
Thickness	<a href="#">Table II</a>	ATSM D1777
MVTR	<a href="#">Table II</a>	ASTM E96/E96M
Absorbency	<a href="#">Table II</a>	AATCC TM79
Dry time	<a href="#">Table II</a>	4.5.1.1
Fabric stretch		
Courses	<a href="#">Table II</a>	ASTM D2594/D2594M (loose fit)
Wales	<a href="#">Table II</a>	ASTM D2594/D2594M (loose fit)
Dimensional stability (3 cycles)		
Courses	<a href="#">Table II</a>	AATCC TM135, 3 cycles, (1) III, (A) ii
Wales	<a href="#">Table II</a>	AATCC TM135, 3 cycles, (1) III, (A) ii
Visual shade matching	<a href="#">Table II</a>	See 4.6.2
Spectral reflectance	<a href="#">Table V</a>	See 4.6.1

TABLE XII. Visual examination.

Examination	Defect	Classification	
		Major	Minor
Workmanship	Component part omitted, distorted, full, tight, or twisted; any part of end item caught in any unrelated stitching; the edge of any component part required to be forced out having folds of more than 1/8 inch.	101	
Material	Hole, cut, tear, smash, burn, drill hole, run, needle chew, visible mend, thin place, or misweave affecting appearance or serviceability.	102	
Shade	a. Shade variation within a part or between parts; thread color not as specified.	103	
	b. Dye streak; color not as specified	104	
Seams and stitching	a. Seams puckered, distorted, pleated, wavy, or twisted; edge or raised stitching sewn too close to edge, resulting in damage to cloth.		201
	b. Irregular or open seam; raw edge affecting appearance or serviceability.	105	
	c. Seam, seam allowance, or stitch type not as specified.		202
	d. Loose or tight stitch tension; broken or missing thread or stitch.		203
	e. Stitches or tack missing or not as specified.	106	
Cleanliness	Spot, stain, excessive thread ends not trimmed or removed, odor.		204
Labels	a. Label omitted, incorrect type, size, or configuration; illegible, inaccurate, or not attached as specified.	107	
	b. Barcodes omitted or not readable by scanner; human-readable interpretation (HRI) omitted or illegible.		205
	c. Barcode not visible on folded, packaged item.		206
	d. Barcode attachment causes damage to the item.	108	
Packaging	Any cap not packaged in accordance with the contract or purchase order.		207

4.5.1.1 Drying time. The dry time test shall be run in standard textile conditions, 65±5 percent relative humidity and 70±4 °F on three specimens. The fabric samples and blotting paper shall be conditioned at standard textile conditions for a minimum of 4 hours. The weight of the conditioned specimen shall be measured using a laboratory balance, accurate to 0.01 grams. A wire mesh kitchen/bathroom sink strainer may be used by placing it on the weight pan of the lab balance in an inverted manner and taring its weight before the measurement of any specimen weight. After weighing the samples, 100 milliliters of distilled water shall be placed into a 250 milliliter glass beaker. The specimen shall be completely submerged (to ensure complete wetting) in the beaker of water for 30 minutes. The specimen shall then be removed and placed between two pieces of unused blotting paper. The blotting paper-enclosed specimen shall be passed through a motor-driven wringer (see 6.5.7). With a dead weight load of 27.2 ±0.5 kilograms (60 ±1 pounds) and speed of 1 inch per second, the specimen shall immediately be placed on the balance with the top door of the balance open and side doors closed. The wet weight shall be recorded to the nearest 0.01 grams. The weight shall be manually monitored at set intervals until dry; alternatively, an automated balance with the capability to weigh the specimen until dry may be used. The time to dry (t) shall be recorded. This process should be repeated for the remaining specimens.

4.5.2 End item testing. Cap insulation shall be tested as specified in 4.5.2.1 for the characteristics specified in 3.9. Samples that do not meet the requirements specified shall be considered failures.

4.5.2.1 Thermal insulation test. Three separate samples of the cap shall be evaluated and the average value reported. Total thermal resistance (R) values can be converted to the more familiar clo unit to allow ranking order of standard for procurement purposes. Test size shall be size large. A life-sized biophysical model of the human head that measures localized and total thermal resistance shall be used. Insulation values for the total head model and its seven individual regions are calculated by an internal program during 30 minutes of steady state data collection. The ambient temperature shall be maintained at  $5 \pm 0.5$  °C and the surface of the head model is controlled at 30 °C. The wind speed shall be maintained at 2 to 3 meters per second and turbulent.

R to heat exchange is calculated in the test conditions above and using the following equation:

$$R = \frac{SA \times \text{delta T}}{P}$$

Where:

R = thermal resistance, m<sup>2</sup> °C/watt

SA = total surface area of regional segments, m<sup>2</sup>

Delta T = temperature gradient between the head model surface and ambient air temperature, °C

P = total power input, watts

If required (see 6.2), caps will be tested by the Government. Testing at contractor facilities is not recommended because testing at alternate facilities shall require side-by-side comparison with a standard sample due to chamber wind speed differences that cannot be controlled and that will affect the total measured values.

4.5.3 In-process examination. Visual and dimensional examinations shall be made at any point or during any phase of the manufacturing process to determine whether construction details, which cannot be examined in the finished product, are in accordance with the requirements specified in section 3. Any in-process nonconformance remaining in the finished cap shall be classified as a defect in accordance with the visual examination of 4.5.4. Materials and components that contain defects and damages, as defined in [table XII](#), shall be removed from production.

4.5.4 Visual examination. The cap shall be examined for defects in color, shade, design, material, construction, workmanship, and markings, and the defects shall be classified in accordance with the list of defects specified in [table XII](#). The inspection conditions and the AQLs shall be as specified (see 6.2).

4.5.5 Dimensional examination. The cap shall be examined for conformance to the dimensions specified in [table VI](#) as defined in [table VII](#). Any measurement deviating from the dimensions and tolerances specified shall be scored as a measurement defect. The inspection conditions and the AQLs shall be as specified in the contract or order (see 6.2). When measuring headwear circumference, the cap shall be placed down on the crown and an appropriate cap measuring device (see 6.8) shall be used.

4.5.6 Toxicity assessment. If specified (see 6.2), an acute dermal irritation study and a skin sensitization study shall be conducted. When the results of the studies indicate the cap is not a sensitizer or irritant, a repeat insult patch test shall be performed in accordance with the Modified Draize Procedure (see Hayes' Principles and Methods of Toxicology). If the toxicity requirement (see 3.10) can be demonstrated with historical data, then toxicity testing may not be required.

#### 4.6 Examinations and tests.

4.6.1 Spectral reflectance test. Spectral reflectance data shall be obtained from 600 to 860 nanometers at 20-nanometer intervals on a spectrophotometer relative to the polytetrafluoroethylene (PTFE) family of compounds, the preferred white standard. Other white reference materials may be used, provided they are calibrated to absolute white. The spectral band width shall be less than 20 nanometers at 860 nanometers. Reflectance measurements shall be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode of operation is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a continuous source that simulates either CIE source A or CIE source D65. Measurements shall be taken on a minimum of two different areas and the data averaged. The measured areas should be at least 6 inches away from the selvage. The basic shell material shall be measured as a single layer backed with four layers of the same fabric and shade; the insulation material shall be measured as a single layer backed with two layers of the same fabric and shade. The specimen shall be viewed at an angle no greater than 10 degrees from normal, with the specular component included. Measurements shall be taken on a minimum of two different areas. Specimens shall be oriented in different directions during testing. When possible, the specimens tested shall not contain the same warp (or filling yarns) and wales (or courses) when presented to the sample port.

Camouflage materials should be measured with the appropriate aperture size to ensure that only one color is measured at a time. The largest aperture possible should be used. Photometric accuracy of the spectrophotometer shall be within 1 percent and wavelength accuracy within 2 nanometers. Any color having spectral reflectance values falling outside the limits at four or more of the wavelengths specified shall be considered a test failure.

4.6.2 Visual shade matching. Samples shall be viewed using AATCC EP9, option C (see 6.4), with sources simulating artificial daylight D65 illuminant (see 6.4.1) with a color temperature of  $6500 \pm 200$  Kelvin (K) illumination of  $100 \pm 20$  foot candles, and shall be a good approximation to the standard sample under incandescent A illuminant with a color temperature of  $2856 \pm 200$ K.

#### 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

#### 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The cap is intended for use with the cold weather clothing system worn by personnel of the United States Marine Corps.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Classes and sizes required (see 1.2).
- c. When first article is required (see 3.1.1).
- d. When conformance inspection is required (see 3.1.2).
- e. Applicable Government patterns and reference standards, including revisions (see 3.3.1.1 and 3.3.1.2).
- f. Barcode and label tag location (see 3.3.2.4.2 and 3.3.2.4.3).
- g. Standard patterns furnished by the Government (see 3.5).
- h. Stitches per inch, if other than as specified (see 3.6.1).
- i. AQLs and inspection conditions (see 3.11, 4.3.1, 4.5.4, and 4.5.5).



- j. Inspection conditions (see 4.2).
- k. First article sampling and acceptance criteria (see 4.3.1).
- l. Conformance inspection examinations and tests, if other than as specified (see 4.4).
- m. Material and component sampling and acceptance criteria, if other than as specified (see 4.4.1).
- n. End item sampling and acceptance criteria, if other than as specified (see 4.4.2).
- o. Component and material examinations and tests, if other than as specified (see 4.5.1).
- p. Whether testing by the Government is required (see 4.5.2.1).
- q. When toxicity testing is required (see 4.5.6).
- r. Packaging requirements (see 5.1).

6.3 First article. When first article inspection is required (see 6.2), the contracting officer should provide specific guidance to offerors regarding whether the item(s) should be a first article sample, a first production item, or a standard production item from the contractor's current inventory, and the number of items to be tested as specified in 4.3. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product that has been previously acquired or tested by the Government and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4 Visual shade matching. In 2019, option A of AATCC EP9 was changed to option C. NOTE: In case of confusion, the viewing geometry should be such that the specimen plane and illumination source are parallel to each other and aligned so that the light flux is incident at the center of the specimen plane, which is set at a  $35\pm 5$ -degree angle relative to the horizontal. The observer will view the specimens at a 90-degree angle, relative to the plane of the specimens.

6.4.1 Use of D75 illuminant. The use of D75 illuminant with a color temperature of  $7500\pm 200$ K illumination of  $100\pm 20$  foot candles in lieu of the specified D65 illuminant (see 4.6.2) is permitted.

6.5 Suggested sources.

6.5.1 Basic material. Brookwood style Shawnee S11764 has been shown to meet the requirements of this specification. A known source of this material is the following:

Brookwood Companies Incorporated  
485 Madison Ave, Suite 500  
New York, NY 10022  
212-551-0100  
<https://www.brookwoodcos.com/>

6.5.2 Insulation. Milliken & Company style 4060M has been shown to meet the requirements of this specification. A known source of insulation material is the following:

Milliken & Company  
920 Milliken Road M-159  
Spartanburg, SC 29304  
864-503-2020  
<http://www.milliken.com/>

6.5.3 Interfacing. Harodite Industries style Instro-475 has been shown to meet the requirements of this specification. A known source of interfacing is the following:

Harodite Industries, Inc.

66 South St.

Taunton, MA 02780

508-824-6961

<http://www.harodite.com/>

6.5.4 Labels. Known sources of labels meeting the requirements of this specification are the following:

Universal Tag

36 Hall Rd. P.O. Box 1518

Dudley, MA 01571

508-949-2411

[www.universaltag.com](http://www.universaltag.com)

Creative Labels, Inc.

6650 Silacci Way

Gilroy, CA 95020

408-842-0376

[www.creativelabels.com](http://www.creativelabels.com)

6.5.5 Low profile hook and loop. Velcro® Brand High Technology Hook (HTH) 745 and Low Profile Knit Loop 3610, or equivalent, has been demonstrated to meet the requirements of this specification. Known sources of this hook and loop fastener are the following:

iTape Store

855 Jerusalem Road

Scotch Plains, NJ 07076

888-634-1908

[www.itapestore.com/](http://www.itapestore.com/)

Gleicher Manufacturing Corporation

851 Jerusalem Road

Scotch Plains, NJ 07076

888-818-5798

[www.gleicher.com/](http://www.gleicher.com/)

6.5.6 Elastic. A known source of 3/4-inch nylon elastic is the following:

North East Knitting, Inc.

179 Conan Street

Pawtucket, RI 02860

401-724-3840

<http://nekinc.com>

6.5.7 Powered wringer. SDL Atlas Model D394 Laboratory Wringer, or equivalent, has been demonstrated to meet the requirements of this specification. A known source of this equipment is the following:

SDL Atlas

3934 Airway Drive

Rock Hill, SC 29732

803-329 2110

<https://sdlatlas.com/>

6.6 NSNs. For informational purposes only, NSNs that correspond to this specification are listed in [table XIII](#). [Table XIII](#) is not intended to be a comprehensive list of all NSNs associated with this specification.

TABLE XIII. NSNs.

<b>NSN</b>	<b>Size</b>
8415-01-695-3401	Small
8415-01-695-3402	Medium
8415-01-695-3403	Large
8415-01-695-3404	Extra Large

6.7 Certificates of compliance. The contracting activity may select to accept a certificate of compliance for selected requirements. Manufacturers should consult with the contracting activity prior to using certificates of compliance to meet requirements.

6.8 Circumference measuring device. A suitable circumference measuring device performs the two critical functions of the measuring device, which are to maintain a uniform diameter and to provide repeatable measurements. Several “scissor type hat calipers” have demonstrated this capability. However, any measuring device that provides these two critical functions is appropriate.

6.9 Subject term (key word) listing.

Ear flaps

Insulation

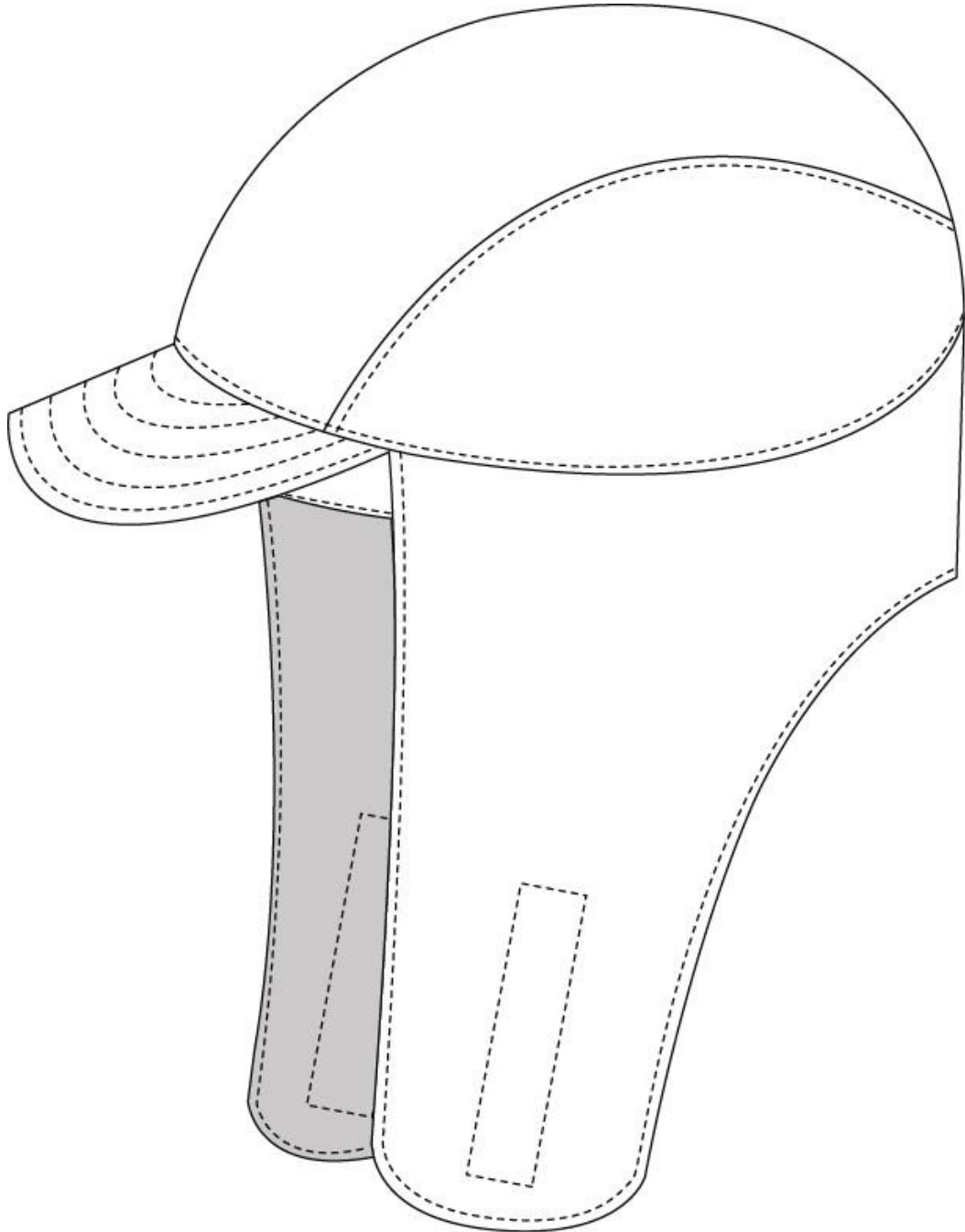


FIGURE 1. Outside – side view.

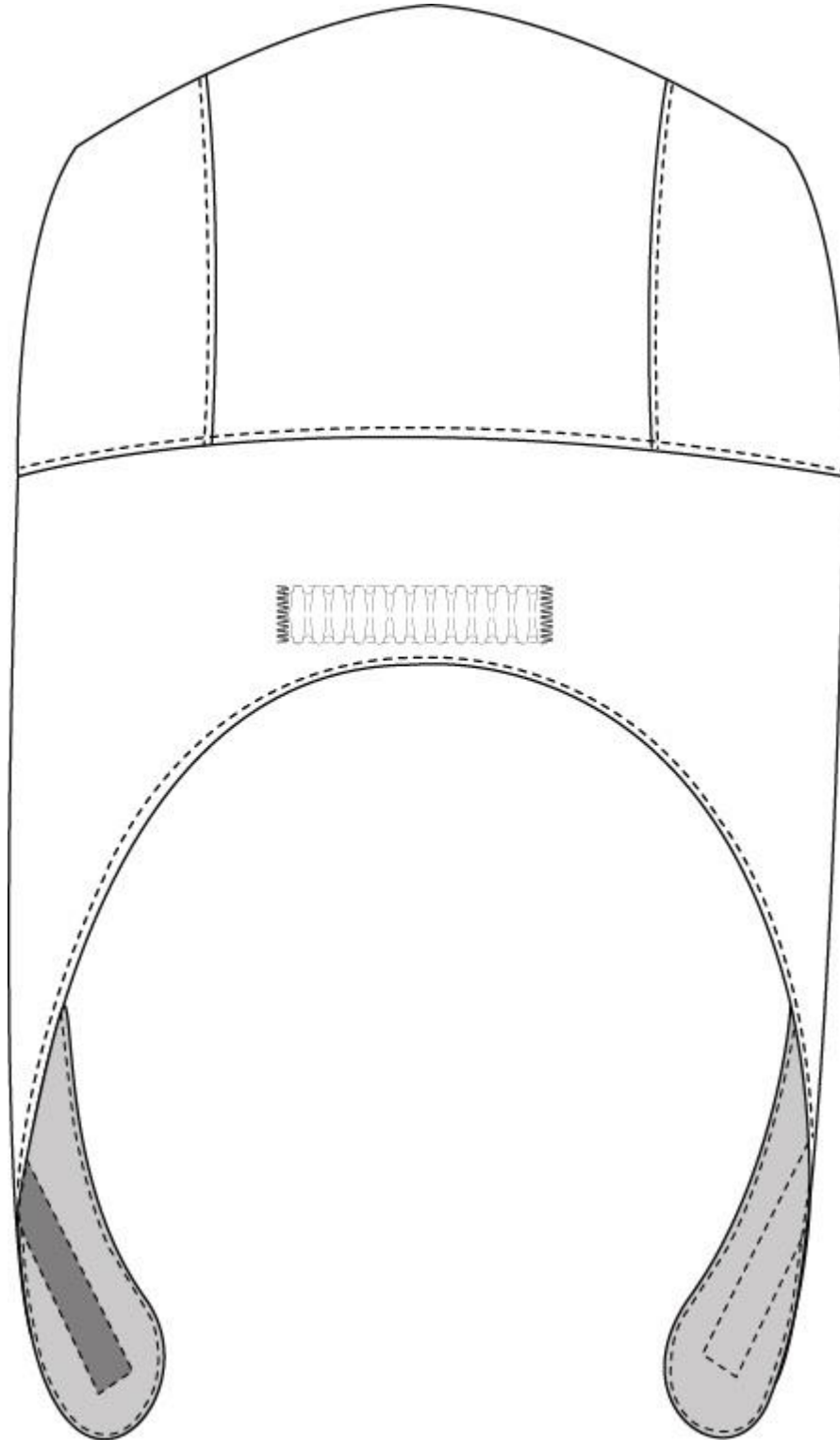


FIGURE 2. Outside – back view.

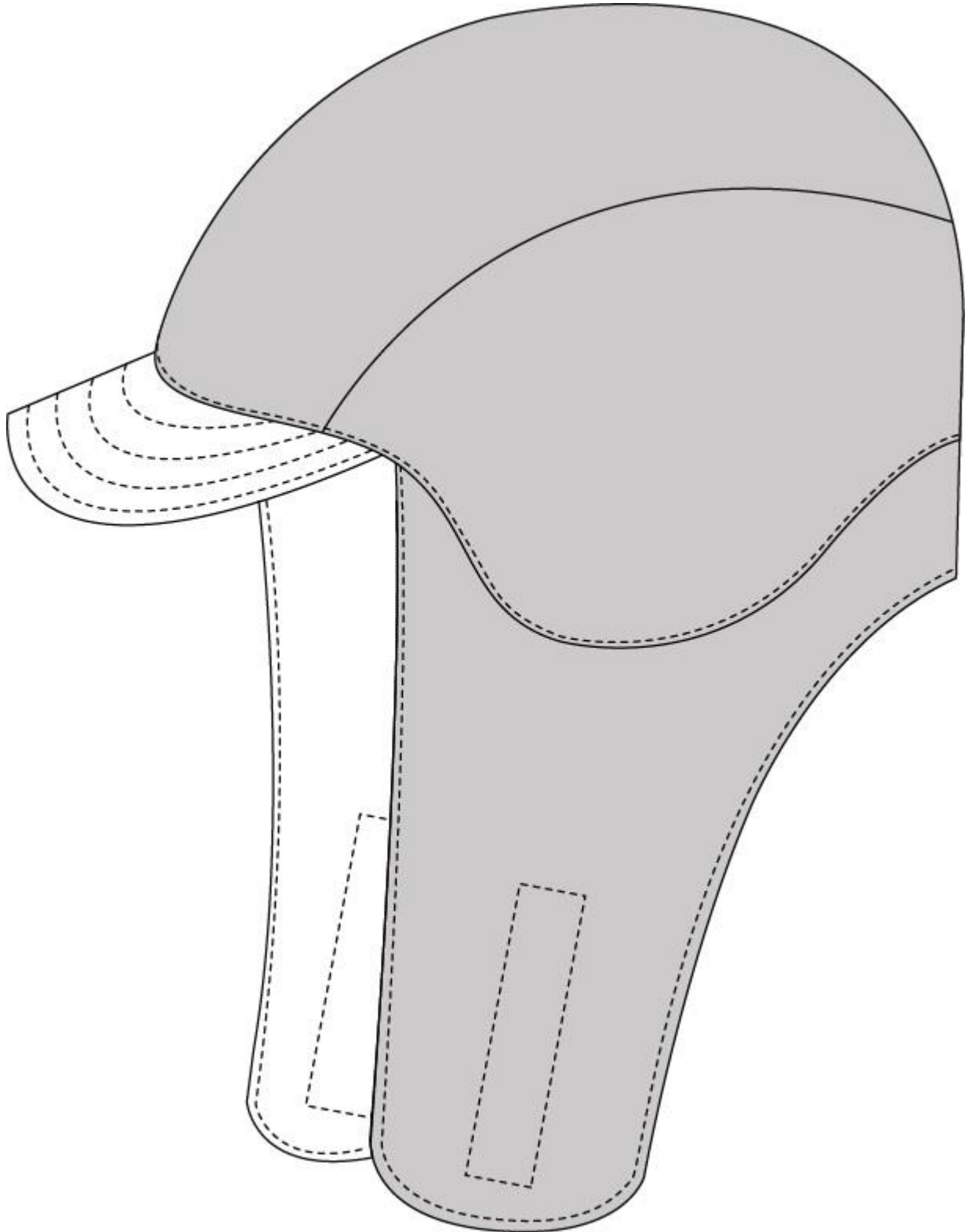


FIGURE 3. Inside – side view.

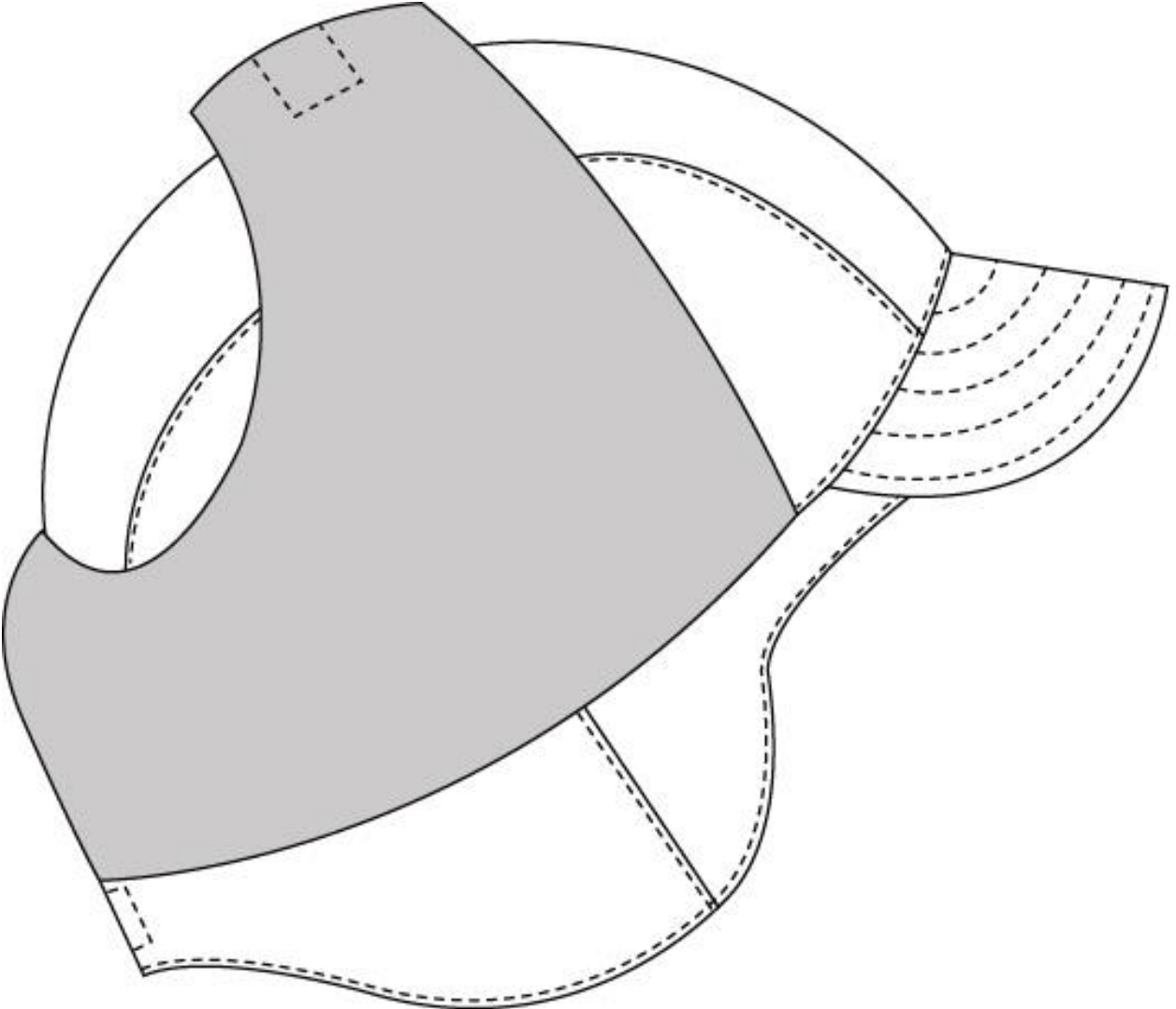


FIGURE 4. Outside – side view (flaps connected).

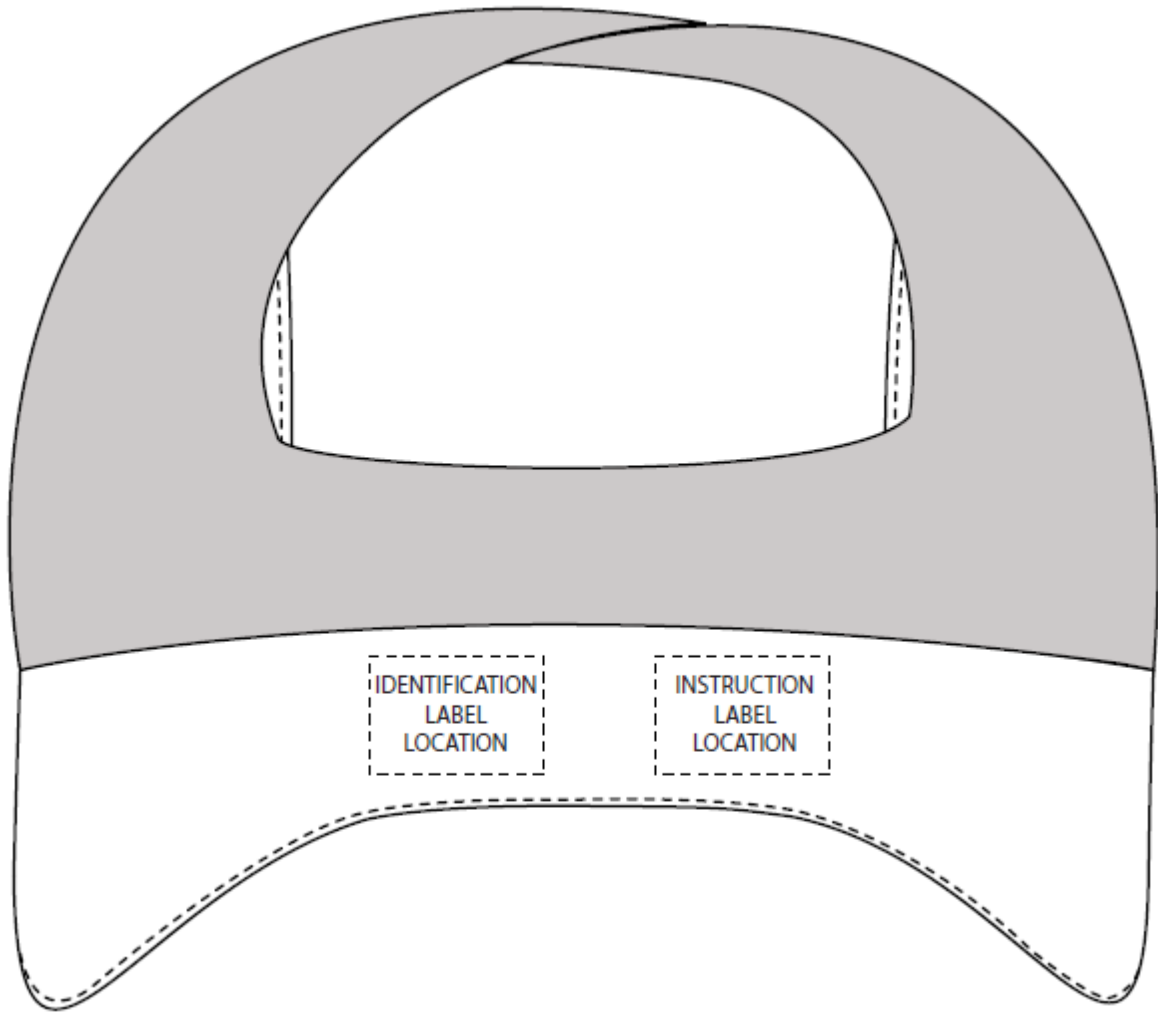


FIGURE 5. Inside – back view.



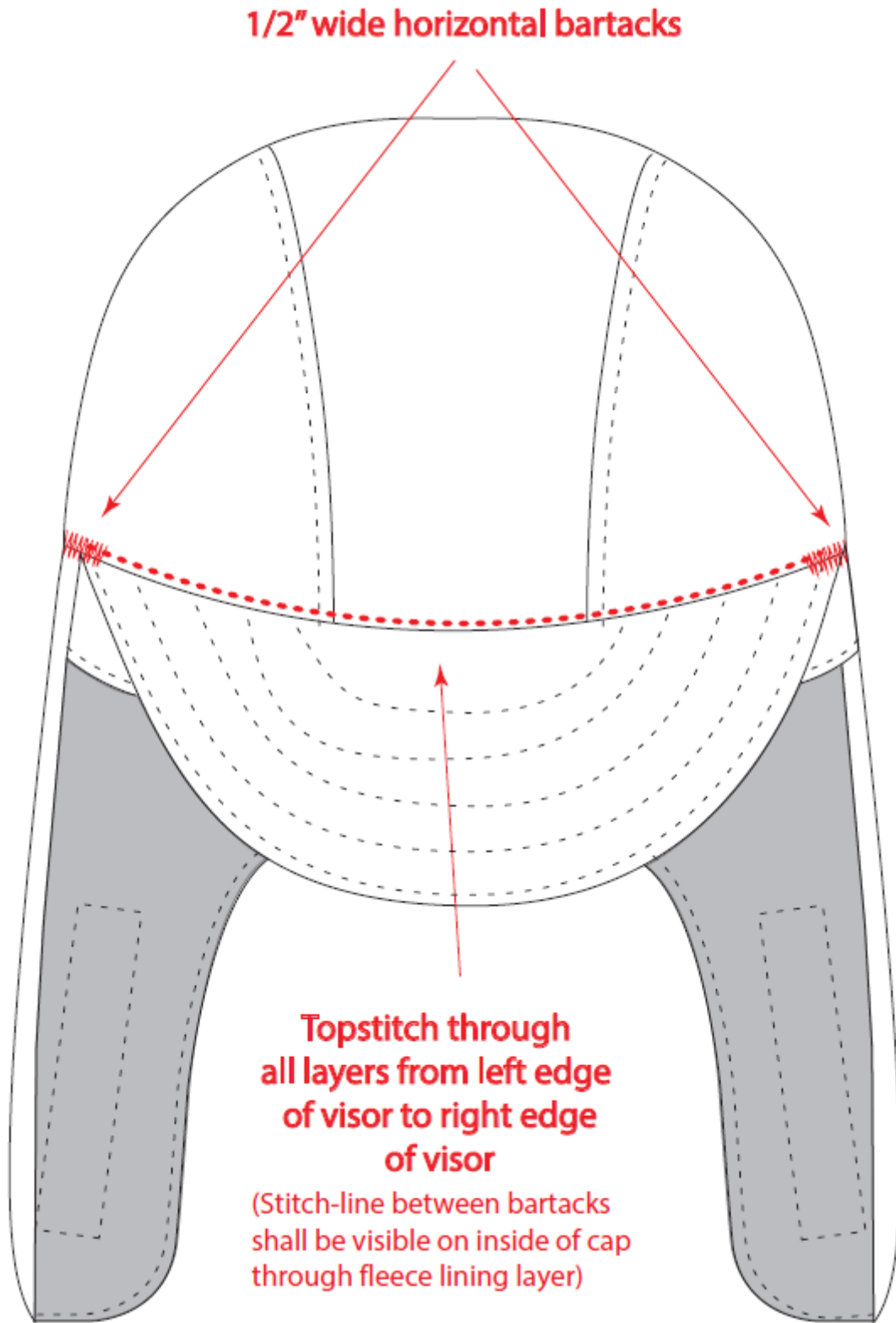


FIGURE 6. Visor top stitch and bartacks view.

CONCLUDING MATERIAL

Custodians:

Army – AV  
Navy – MC  
Air Force – 03

Preparing activity:

Navy – MC  
(Project 8415-2022-003)

Review activities:

Army – CR, GL, MI  
Navy – AS, CG1, NU  
Air Force – 11, 70  
DLA – CT

Civil agency:

GSA – FAS

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.