INCH-POUND

MIL-DTL-823L
13 April 2005
SUPERSEDING
MIL-C-823K
21 September 1990

DETAIL SPECIFICATION

CLOTH, SERGE, WOOL, WOOL AND NYLON, POLYESTER AND WOOL

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 wool, wool and nylon, and polyester and wool serge cloth.

1.2 Classification. The cloth should be of the following types and classes as specified (see 6.2 and 6.5):

Comments, suggestions, or questions on this document should be addressed to: Defense Supply Center Philadelphia, Clothing and Textiles Directorate, ATTN: DSCP-CRDD, 700 Robbins Avenue, Bldg. 6D, Philadelphia, PA 19111-5092, or emailed to http://ct.dscp.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil.

AMSC N/A FSC 8305

Type I	-	Wool
Class 1	-	18 ounce
Class 2	-	16 ounce
Class 3	-	16 ounce
Class 5	-	15 ounce
Class 7	-	12 ounce
Class 8	-	12 ounce
Type II	-	Wool and Nylon
Class 1	-	18 ounce
Class 2	-	16 ounce
Type III	-	Polyester and Wool
Class 1	-	14 ounce
Class 2	-	12 ounce
Class 3	-	11.3 ounce
Class 4	-	9.5 ounce

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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 completeness of this list, document users are cautioned that they must meet all the specified requirements documents cited in sections 3, 4, or 5 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.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-C-43665	-	Cloth, Wool: Mothproofing Treatment of

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-129	-	Marking for Shipment and Storage
MIL-STD-655	-	Provisions for Evaluating Quality of Cloth, Wool, Worsted and Wool Blends

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation or contract.

GOVERNMENT PRINTING OFFICE

Rules and Regulations under the Wool Products Labeling Act

(Copies of this document may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

U.S. DEPARTMENT OF AGRICULTURE (USDA)

Methods of Test for Grades of Wool Top
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(Copies of this document may be obtained from the U.S. Department of Agriculture, USDA Marketing Service Information Office, Room 3510-S, P.O. Box 96456, Washington, DC 20090-6456.)

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.

ASTM INTERNATIONAL

ASTM D3511	-	Standard Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics Brush Pilling Tester
ASTM D3775	-	Standard Test Method for Fabric Count of Woven Fabric
ASTM D3776	-	Standard Test Method for Stiffness of Fabrics
ASTM D5034	-	Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

(Copies of these documents are available from http://www.astm.org/ or ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

AATCC 8	-	Colorfastness to Crocking: AATCC Crockmeter Method
AATCC 15	-	Colorfastness to Perspiration
AATCC 16	-	Colorfastness to Light
AATCC 20A	-	Fiber Analysis: Quantitative
AATCC 81	-	pH of the Water-Extract from Bleached Textiles
AATCC 99	-	Dimensional Changes of Woven or Knitted Textiles: Relaxation
AATCC 117	-	Colorfastness to Heat; Dry (Excluding Pressing)
AATCC 132	-	Colorfastness to Drycleaning

(Copies of these documents are available from http://www.aatcc.org/ or American Association of Textile Chemists and Colorists (AATCC), P.O. Box 12215, Research Triangle Park, NC 27705-2215.)

AMERICAN SOCIETY FOR QUALITY CONTROL

ASQC Z1.4	-	Sampling Procedures and Tables for Inspection by Attributes

(Copies of this document are available from http://www.asqc.org/ or American Society for Quality Control (ASQC), P.O. Box 3005, 611 East Wisconsin Avenue, Milwaukee, WI 53201-4606.)

2.4 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 takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified, a sample shall be subjected to first article inspection (see 4.2 and 6.3)

3.2 Standard sample. The finished cloth shall match the standard sample for shade, finish, colorfastness, and appearance and shall be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.4).

3.3 Material.

3.3.1 Wool. The wool component of the cloth shall be not lower than the grades specified below:

Types I and II

Class 1 (18 oz.)	-	60's U.S. Standard
Class 2 (16 oz.)	-	60's U.S. Standard
Class 3 (16 oz.)	-	64's U.S. Standard
Class 5 (15 oz.)	-	62's U.S. Standard
Class 7 (12 oz.)	-	64's U.S. Standard
Class 8 (12 oz.)	-	64's U.S. Standard

Type III

Class 1 (14 oz.)	-	64's U.S. Standard
Class 2 (12 oz.)	-	64's U.S. Standard
Class 3 (11.3 oz.)	-	64's U.S. Standard
Class 4 (9.5 oz.)	-	64's U.S. Standard

3.3.1.1 Type I. The wool top for Type I shall be fleece wool, pulled wool, or an combination thereof not lower in grade than specified in 3.3.1 and shall be of a suitable staple length to meet the requirements of this document. The use of laps, noils, or any other wool manufacturing by-products shall be prohibited (see 4.3.2).

3.3.1.2 Type II. The blend for Type II shall consist of fleece wool, pulled wool, or any combination thereof not lower in grade than specified in 3.3.1 and nylon top or cut tow (see 6.2). Unless otherwise specified (see 6.2), the blend shall be in such proportion that the finished cloth shall contain between 80 to 85 percent wool with the remaining percentage of nylon fiber, based on the oven-dried weight when tested as specified in 4.3.2. The nylon fibers shall be of a suitable denier and the wool and nylon fibers of suitable length the meet the requirements of this document. The use of laps, noils, or any other wool manufacturing by-products and nylon fiber waste shall be prohibited (see 4.3.2).

3.3.1.3 Type III. The blend for Type III shall consist of fleece wool, pulled wool, or any other combination thereof not lower in grade than specified in 3.3.1 and polyester top or cut tow (see 6.2). The polyester stock shall be semi-dull and the minimum average fiber length shall be 3 inches. The denier shall be suitable to blend adequately with the specified wool grade and meet the requirements of this document. Wool yarns shall be spun on the long staple worsted system. Minimum average fiber length shall be 3 inches. The use of laps, noils, or any other wool manufacturing by-products and polyester fiber waste shall be prohibited (see 4.3.2). The finished cloth shall consist of a polyester fiber percentage of 55 minimum and 60 maximum and a minimum wool fiber percentage of 40 based on the oven-dried weight when tested as specified in 4.3.4.

3.3.2 Yarn. The yarn for the warp and filling shall be spun from combed top. The yarn ply shall be as specified under physical requirements (see 3.5). To prevent edges of all types of cloth from building up when rolled, 2-ply yarns used in the selvage may be made of a finer count than those used in the body of the cloth.

3.4 Color. The color shall be as specified (see 6.2). The color of the finished cloth shall match the standard sample (see 6.4). The color shall be applied in stock or top form. Speck dyeing shall be prohibited. When Army Green 44 is specified, the color shall be produced by blending dyed wool top (see 6.6). When Army Green 489 is specified, the color shall be produced by blended dyed wool top and dyed polyester fiber (see 6.5).

3.4.1 Mothproofing. Mothproofing of the wool material shall be in accordance with MIL-C-43665. It shall be accomplished during stock or top dyeing and tested as specified in 4.3.4.

3.4.2 Shade matching. The color of the finished cloth shall match the standard sample when viewed under filtered tungsten lamps, which approximate artificial daylight having a correlated color temperature of 7500 $\pm$ 200 Kelvin (K), with illumination of 100 $\pm$ 20 foot-candles, and shall be a good match to the sample under incandescent lamplight at 2300 $\pm$ 200 K.

3.4.3 Colorfastness. The finished cloth shall show fastness to wet drycleaning, perspiration and light (after 80 AATCC Fading Units) equal to or better than the standard sample or equal to or better than a rating of “good (3.0)” when no standard sample is available. In addition, the Type III polyester and wool cloth shall show “good (3.0)” fastness to dry heat (sublimation). The finished cloth shall show fastness to crocking equal to or better than the standard sample or shall have an AATCC Chromatic Transference Scale rating of not lower 3.5 when no standard sample is available. Testing shall be as specified in 4.3.4.

3.5 Physical requirements. The finished cloth shall conform to the requirements specified in Table I and when tested as specified in 4.3.4.

TABLE I. Physical requirements.

Type	Class	Weight oz./ linear yd. (min.) 1/	Wool Std.	Yarn Ply		Yarns per inch (min.)		Breaking strength (min.)		Dimensional Stability (min.)	
				Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling
								Lbs.	Lbs.	Pct.	Pct.
I	1	18.0	60's	2	2	68	54	110	100	4.0	2.5
I	2	16.0	60's	2	1	70	54	100	80	4.0	2.5
I	3	16.0	64's	2	2	68	64	100	90	4.0	3.0
I	5	15.0	62's	2	2	70	58	100	80	5.0	3.0
I	7	12.0	64's	2	2	74	70	80	70	5.0	3.0
I	8	12.0	64's	2	2	70	62	80	70	5.0	3.0
II	1	18.0	60's	2	1	66	52	135	120	4.0	2.5
II	2	16.0	60's	2	1	70	54	120	110	4.0	2.5
III	1	14.0	64's	2	1	78	55	175	130	4.0	3.0
III	2	12.0	64's	2	2	74	68	150	125	4.0	3.0
III	3	11.3 12.3 (max.)	64's	2	2	78	68	140	125	2.0	2.0
III	4	9.5	64's	2	2	78	66	115`	85	3.0	2.5

1/ Weight is based on a 56 inch width.

3.5.1 Width. The width of all types and classes of finished cloth shall be a minimum of 60 inches exclusive of selvage or tuck-in when woven on Sulzer-type looms.

3.5.2 Weave. The weave for all types and classes of finished cloth shall be a 2 up and 2 down, 4 harness right twill (see 4.3.4).

3.6 Finish and final appearance. The cloth shall be fulled, sheared, and finished to provide stability of both color and finish (see 6.7). The type and characteristic of finish shall conform to that shown by the standard sample.

3.6.1 Pilling. The Type III cloth shall be finished to show no more pilling than the standard sample when tested as specified in 4.3.4.

3.6.2 pH. The pH value of the water extract of the finished cloth shall be between 5.5 and 8.5 inclusive when tested as specified in 4.3.4.

3.7 Length and put-up. Unless otherwise specified (see 6.2), the cloth shall be furnished in continuous lengths, each not less than 50 yards. Each length shall be put-up on full width rolls in accordance with the industry's standard practice.

3.8 Wool content. The finished Type I cloth shall contain not less than 95 percent wool based on the dry weight of the specimen when tested as specified in 4.3.4.

3.9 Wool content label. Cloth manufactured under this document shall be labeled in accordance with the Wool Products Labeling Act.

3.10 Marking. The back of the cloth shall be marked "BACK" at both ends of each roll with letters not less than 1/2 inch in height (see 4.3.3.5). The marking shall be clearly legible in any indelible marking used commercially. When defects appear in the cloth, each defect shall be marked with a 1 to 1-1/2 inch long string. The string shall be sewn into the selvage near the defect. A red string shall represent a three-or-four point defect and a white string will represent a one-or-two point defect (see 4.3.3). In addition to any special markings required, shipments shall be marked in accordance with MIL-STD-129.

3.11 Packaging criteria. Each roll shall have a piece ticket attached to the selvage containing the identification information desired (see Figure 1). Each wrapped or overwrapped roll (see Figure 2) shall be clearly marked on the wrapping at the end where the identification tag is attached as follows:

"TAG HERE"

As a minimum, each roll shall be packed in a polyethylene bag.

3.12 Workmanship. The finished cloth shall conform to the quality established by this document.

4. VERIFICATION

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

a. First article inspection (see 4.2).

b. Conformance inspection (see 4.3).

4.2 First article inspection. When specified (see 6.2), sample yardage shall be subjected to first article inspection in accordance with Table II.

TABLE II. First article inspections

Inspection	Requirement	Inspection Method
Visual examination:		
Wool grade examination	3.3.1	4.3.3, 4.3.3.1
Color	3.4	4.3.3
Shade matching	3.4.2	4.3.3, 4.3.3.4
Weave	3.5.2	4.3.4, Table III
Finish and appearance	3.6, 3.11	4.3.3, 4.3.3.1, 4.3.3.4
Length and put-up	3.7	4.3.3.5
Wool content label	3.8	4.3.3, 4.3.3.3
Markings	3.10	4.3.3, 4.3.3.3
Dimensional examination:		
Width	3.5.1	4.3.3
Physical characteristics of finished cloth	3.3.1.1, 3.3.1.2, 3.3.1.3, 3.3.2, 3.4.2, 3.4.3, 3.4.1, 3.5, 3.6.1, 3.6.2, 3.8, Table I	4.3.2, 4.3.3.4, 4.3.4, Table III

4.2.1 First article units. The sample yardage selected from the first article lot shall be thoroughly checked for visual, dimensional, and physical conformance to this specification. The first article sample yardage shall be specified in the contract. The sample yardage shall be representative of the construction, workmanship, and materials to be used during the production. The first article shall be furnished to the Government as directed by the contract (see 6.2).

4.3 Conformance inspection. Conformance inspection shall consist of the examinations and tests specified in Table II. Unless otherwise specified, sampling for conformance inspection shall be in accordance with the provisions of ASQC Z1.4.

4.3.1 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.

4.3.1.1 Wool grade examination. The wool shall be visually examined for grade (see 3.3.1) in undyed top form by comparison with the applicable U.S. Standard. In the event of a dispute, the wool grade shall be determined by the width method (wedge). The sample unit shall be 1 yard of undyed top prior to blending with nylon or polyester fibers. The sample size shall be as shown below. The result from each sample unit shall be reported separately. The lot shall be unacceptable if one or more sample units fail the meet the required grade.

Lot size (pounds)	Sample size (sample units)
800 or less	2
801 up to and including 22,000	3
22,001 and over	5

4.3.2 In-process inspection. Inspection shall be made at any point during any phase of the manufacturing operation to assure that no laps, noils, or any other wool manufacturing by-products are used (see. 3.3.1.1, 3.3.1.2, and 3.3.1.3), and that the dyeing requirements have been adhered to (see 3.4). The Government reserves the right to exclude from consideration for acceptance any material for which in-process inspection has indicated nonconformance.

4.3.3 Yard-by-yard examination. The yard-by-yard examination shall be as specified in MIL-STD-655. The demerit point per 100 square yards when calculated as specified in MIL-STD-655 shall not exceed the established maximum point value. The fabric quality level for all shades shall be Quality Level 7.

4.3.3.1 Limits of slubs and knots. Only slubs and knots which exceed “D” for slubs and “C” for knots shall be scored.

4.3.3.2 Examination for length. The examination for length shall be as specified in MIL-STD-655.

4.3.3.3 Examination for back marking and compliance with the Wool Products Labeling Act. The examination for back marking and compliance with the Wool Products Labeling Act shall be as specified in MIL-STD-655.

4.3.3.4 Examination for shade match, and finish, individual rolls. A sample from each roll in the lot shall be examined visually for shade (see 3.4.2), finish and appearance (see 3.6). A roll shall be unacceptable if it fails the meet the requirements for shade, finish, or appearance. The sample yardage unit shall be specified in the contract.

4.3.3.5 Examination for defect marking (stringing of defects). The examination for defect marking (stringing of defects) shall be as specified in MIL-STD-655.

4.3.4 End item testing. The cloth shall be tested for the applicable characteristics indicated in Table III. The applicable ASTM and AATCC methods of testing and as listed in Table III shall be followed. The physical and chemical values specified in Section 3 apply to the results of the determinations made on a sample unit for test purposes as specified in the applicable test method. The sample unit shall be 3-1/2 continuous yards full width of the finished cloth. The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified. All test reports shall contain the individual values utilized in expressing the final results. The sample size shall be in accordance with the following:

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

TABLE III. End item tests

Characteristics	Requirement	Test Method
Fiber content (finished cloth):		
Wool (Type I)	3.3.1.1	AATCC 20A
Nylon and wool (Type II)	3.3.1.2	AATCC 20A 1/
Polyester and wool (Type III)	3.3.1.3	AATCC 20A
Mothproofing	3.4.1	2/
Colorfastness to:		
Wet Drycleaning	3.4.3	AATCC 132
Crocking	3.4.3	AATCC 8
Perspiration	3.4.3	AATCC 15
Light (after 80 standard fading hours)	3.4.3	AATCC 16, Option A or Option E
Dry heat (sublimation) at 325°F ± 6°F	3.4.3	AATCC 117
Weight	3.5	ASTM D3776, Option C
Yarn ply:		
Warp	3.5	Visual 3/
Filling	3.5	Visual 3/
Yarns per inch	3.5	ASTM D3775
Breaking strength	3.5	ASTM D5034
Dimensional stability	3.5	AATCC 99, relaxation/dimensional change (Section 7)
Weave	3.5.2	Visual 3/
Pilling (Type III)	3.6.1	ASTM D3511 4/
pH	3.6.2	AATCC 81

1/ Nylon percent = $\frac{S - R}{S} \times 100$

Where: S = Weight of dry chloroform extracted specimen
R = Weight of residual fiber

2/ The test for mothproofing compounds shall be as specified in MIL-C-43665.

3/ One determination per sample unit and the results reported as “pass” or “fail”.

4/ The pilling test shall be conducted in accordance with ASTM D3511, except the five specimens of the test cloth and one specimen of the standard sample shall be used concurrently.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD personnel, those personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point’s packaging activity within the Military Department of Defense Agency, or within the Military Department’s System Command. 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 which may be helpful but is not mandatory.)

6.1 Intended use. The cloths covered by this document are for use in service, semi-dress, dress uniforms and functional clothing used by the Department of Defense.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Type and class required (see 1.2).
c. When a first article is required (see 3.1, 4.2, and 6.3).
d. Whether polyester top or cut tow is required for Type II cloth (see 3.3.1.2).
e. Nylon blend when Type II cloth is required (if other than specified in 3.3.1.2.
f. Whether polyester top or cut tow is required for Type III cloth (see 3.3.1.3).
g. Color required (see 3.4).
h. Minimum length if other than specified (see 3.7).
i. Packaging requirements (see 5.1)

6.3 First article. When a first articled is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209. The first article should be a preproduction sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

6.4 Standard sample. For access to standard samples, address the contracting activity issuing the invitation for bid or request for approval.

6.5 Colors, types, and classes of cloth by the Services. The colors of cloth required by the Services are as follows:

Service	Color	Type	Class	Weight (ounces)
Army	Olive Green 108	I	1	18
	Army Green 44	I or II	2	16
	Army Green 44	I	5	15
	Army Green 44	I	7	12
	Army Green 44	I	8	12
	Army Green 489	III	1	14
	Army Green 489	III	2	12
	Army Green 489	III	3	11.3
Navy	Blue 3346	I	3	16
	Blue 3346	I	5	15
	Blue 3346	I	7	12
Coast Guard	Blue 3362	III	3	11.3
Marine Corps	Green 2234	I	5	15
	Green 2207 and Blue 2305	I	8	12
Air Force	Blue 1620	III	4	9.5

6.6. Shade control. Shade control of those shades dyed on fabrics in the 16-ounce and lighter weight construction is critical and the contractor is accordingly cautioned to exercise special care in color matching such shades (see 3.4).

6.7 Finish. The finish of this cloth is critical and the contractor is accordingly cautioned to insure that the amount of twist in the yarns and the subsequent setting and dry finishing of the fabric are adequately controlled to preclude the possibility of movement of the fiber to the fabric surface during wear, thus increasing the degree of cover beyond that shown by the standard sample (see 6.4).

6.8 Subject term (key word) listing.

Cloth
Fabric
Polyester and Wool
Serge
Uniform
Wool and Nylon

6.9 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:

Army – GL
Navy - NU
Air Force – 11

Preparing activity:

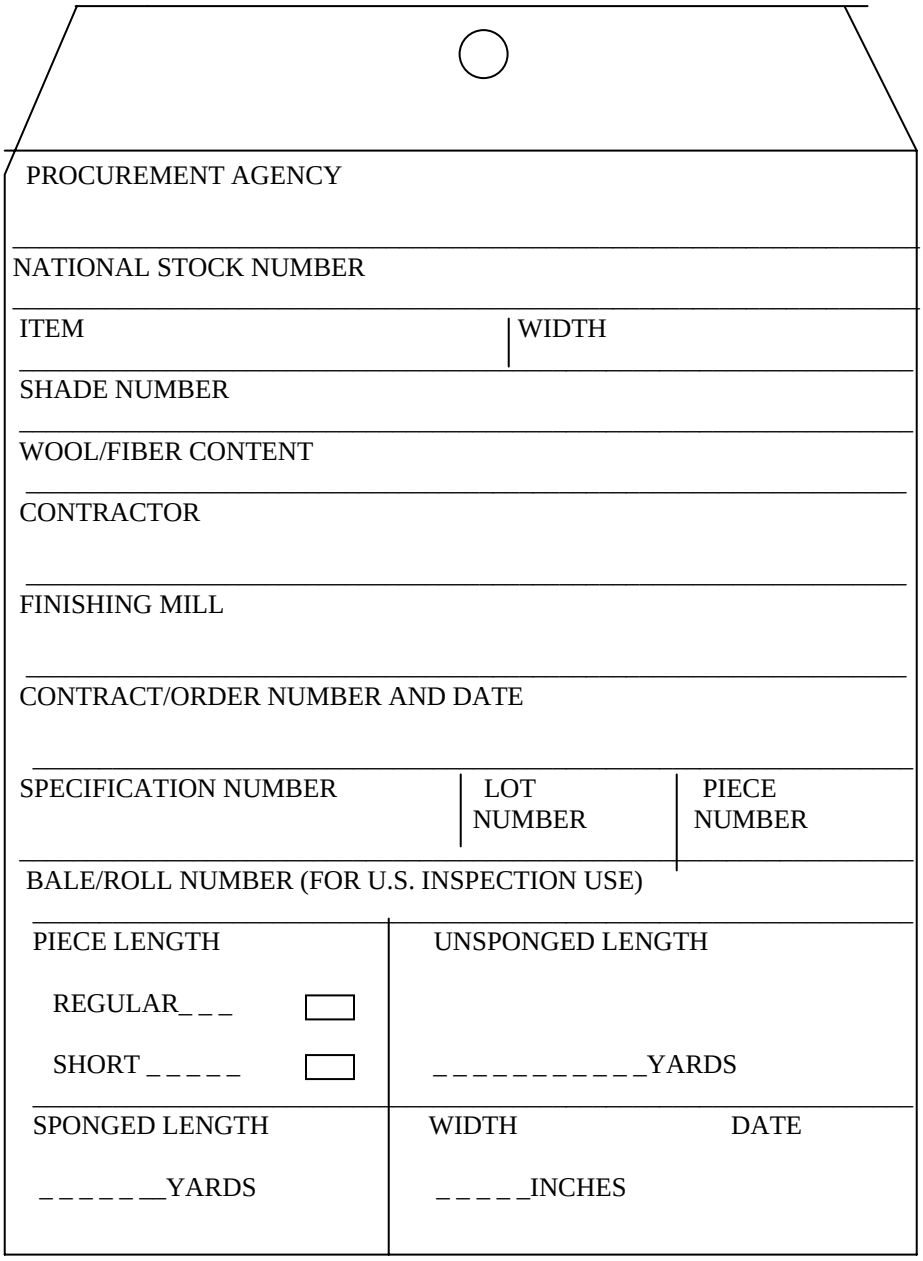
DLA – CT

Project 8305-0820

Review activities:

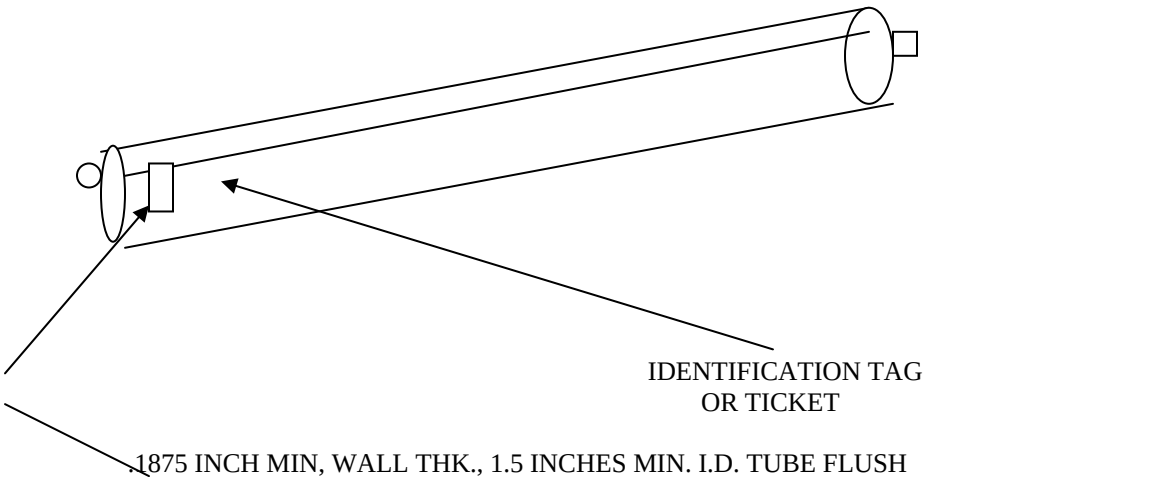
Navy – MC
Coast Guard - CGCT

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 http://assist.daps.dla.mil.

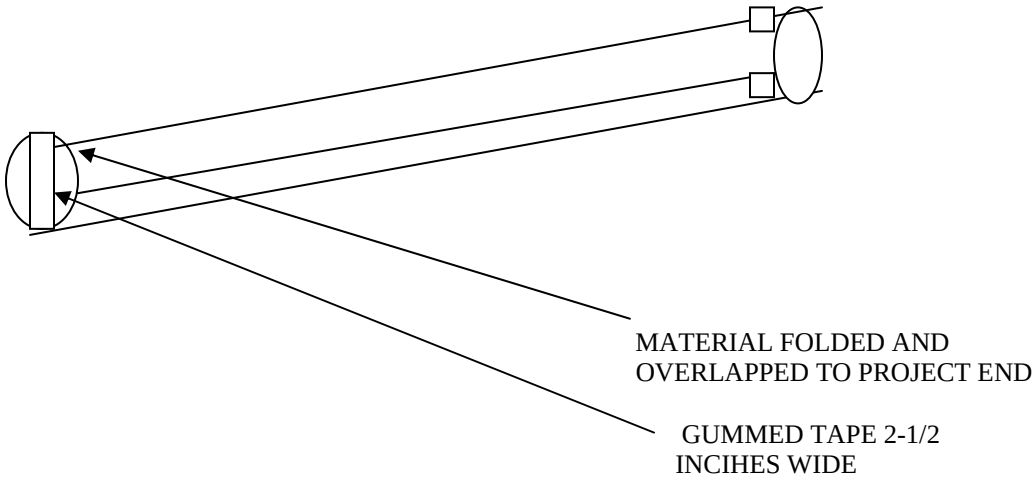


Note: Bar Code Marking shall be placed on reverse side of the piece ticket.

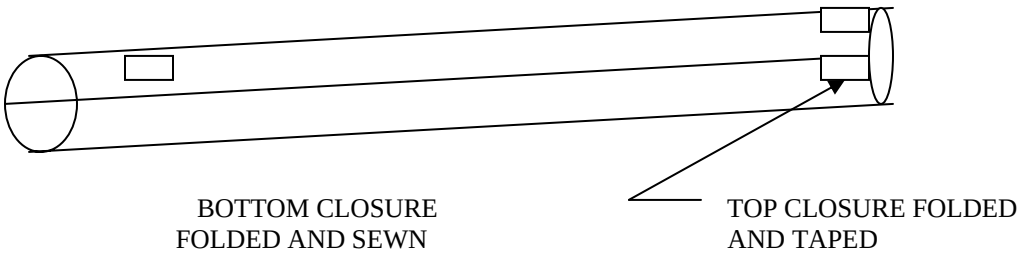
Figure 1. Piece Ticket



PROCESSING METHOD



BASIC WRAPING METHOD



BASIC WRAPPING METHOD – ALTERNATE

Figure 2. Processing and Wrapping of Rolls