INCH-POUND
MIL-DTL-823M
02 September 2020
SUPERSEDING
MIL-DTL-823L
13 April 2005

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 the Defense (DoD).

1. SCOPE

1.1 Scope. This specification covers the requirements for wool, wool and nylon, and polyester and wool serge cloth.

1.2. Classification. The cloth will be available in the following types and classes as specified (see 6.2 and 6.5):

Type I – Wool

Class 1	–	11.6 ounces per square yard
Class 2	–	10.3 ounces per square yard
Class 3	–	10.3 ounces per square yard
Class 5	–	9.6 ounces per square yard
Class 7	–	7.7 ounces per square yard
Class 8	–	7.7 ounces per square yard

Type II – Wool and nylon

Class 1	–	11.6 ounces per square yard
Class 2	–	10.3 ounces per square yard

Comments, suggestions, or questions on this document should be addressed to: Attn: DLA Troop Support Standardization Team, 700 Robbins Avenue, Philadelphia, PA 19111-5096. Since contact information can change, verify the currency of the address information using Acquisition Streamlining and Standardization Information System (ASSIST) online database https://assist.dla.mil/.

AMSC N/A FSC 8305

Type III – Polyester and wool.

Class 1	– 9.0 ounces per square yard
Class 2	– 7.7 ounces per square yard
Class 3	– 7.3 – 7.9 ounces per square yard
Class 4	– 6.1 ounces per square yard

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.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-43665 - Cloth, Wool: Mothproofing treatment of

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-655 - Provisions for Evaluating Quality of Cloth, Wool, Worsted and Wool Blends

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

2.2.2 Other Government documents, drawings, and publications. The following other Government 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.

FEDERAL TRADE COMMISSION

Rules and Regulations Under the Wool Products Labeling Act

(Copies of this document are available online at https://www.ftc.gov.)

U.S. DEPARTMENT OF AGRICULTURE (USDA)

United States (U.S.) Standard for Grades of Wool

(Copies of this document are available online at https://www.ams.usda.gov.)

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 EP1	- Evaluation Procedure for Gray Scale for Color Change
AATCC EP2	- Evaluation Procedure for Gray Scale for Staining
AATCC EP8	- Evaluation Procedure for AATCC 9-Step Chromatic Transference Scale
AATCC EP9	- Evaluation Procedure for Visual Assessment of Color Difference of Textiles
AATCC TM8	- Test Method for Colorfastness to Crocking: Crockmeter
AATCC TM15	- Test Method for Colorfastness to Perspiration
AATCC TM16.3	- Test Method for Colorfastness to Light: Xenon Arc
AATCC TM20A	- Test Method for Fiber Analysis: Quantitative
AATCC TM81	- Test Method for pH of the Water-Extract from Wet Processed Textiles
AATCC TM117	- Test Method for Colorfastness to Heat: Dry (Excluding Pressing)
AATCC TM132	- Test Method for Colorfastness to Drycleaning
AATCC TM158	- Test Method for Dimensional Changes on Drycleaning in Perchloroethylene: Machine

(Copies of these documents are available on line at https://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 https://www.asq.org.)

ASTM INTERNATIONAL

ASTM D3511/D3511M	- Standard Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics Brush Pilling Tester
ASTM D3775	- Standard Test Method for End (Warp) and Pick (Filling) Count of Woven Fabrics
ASTM D3776/D3776M	- Standard Test Methods for Mass per Unit Area (Weight) of Fabric
ASTM D5034	- Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

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

Fabric Defect Replica Scales

(For information on obtaining copies of the Fabric Defect Replica Scales please contact U.S. Army Combat Capabilities Development Command (CCDC), Soldier Center, ATTN: FCDD-SCP-WC, 10 General Greene Avenue, Natick, MA 01760-5019.)

INFORMA HEALTHCARE

Repeat Insult Patch Test - Modified Draize Procedure
Principles and Methods of Toxicology, A Wallace Hayes (editor).

(Copies of this document are available online at https://www.crcpress.com.)

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 supersedes applicable laws and regulations, unless a specific exemption has been obtained.

3. REQUIREMENTS

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

3.2 Standard sample. The finished cloth shall match the standard sample for shade 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 6.3).

3.3 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.

3.4 Materials.

3.4.1 Wool grade. The wool component of the cloth shall not be lower than the grades specified below when tested as specified in the U.S. Standard for Grades of Wool:

Type I and II	
Class 1 (11.6 oz./sq.yd.)	60's U.S. Standard
Class 2 (10.3 oz./sq.yd.)	60's U.S. Standard
Class 3 (10.3 oz./sq.yd.)	64's U.S. Standard
Class 5 (9.6 oz./sq.yd.)	62's U.S. Standard
Class 7 (7.7 oz./sq.yd.)	64's U.S. Standard
Class 8 (7.7 oz./sq.yd.)	64's U.S. Standard

Type III	
Class 1 (9.0 oz./sq.yd.)	64's U.S. Standard
Class 2 (7.7 oz./sq.yd.)	64's U.S. Standard
Class 3 (7.3 -7.9 oz./sq.yd.)	64's U.S. Standard
Class 4 (6.1 oz./sq.yd.)	64's U.S. Standard

3.4.1.1 Type I. The Type I cloth shall be not less than 95 percent wool as either a fleece wool, pulled wool or a combination thereof not lower in grade than specified in 3.4.1 and shall be of a suitable stable length to meet the requirements of this document. The use of laps, noils or any other wool manufacturing by-products shall be prohibited.

3.4.1.2 Type II. The Type II cloth shall consist of a blend of 80 to 85 percent fleece wool, pulled wool or a combination thereof of wool grade as specified in 3.4.1 and the remaining fiber percentage shall be nylon top or cut tow. The nylon fibers shall be of suitable denier and the wool and nylon fibers shall be of suitable fiber length to 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.

3.4.1.3 Type III. The Type III cloth shall consist of a blend of a minimum of 40 percent fleece wool, pulled wool or a combination thereof of wool grade as specified in 3.4.1 and the remaining fiber percentage shall be polyester top or cut tow. The polyester fiber shall be semi-dulled and the minimum average fiber length shall be three (3) inches and of suitable fiber denier that when blended with wool fiber it shall meet the requirements of this document. The wool minimum average fiber length shall be three (3) inches and the wool yarns shall be spun on the long staple worsted system. The use of laps, noils or any other wool manufacturing by-products and polyester waste shall be prohibited.

3.4.2 Yarn. The warp and filling yarns shall be spun from combed top. The yarn ply for each class shall be as specified in Table I. (NOTE: Selvage yarns - to prevent edges from building up when rolled, 2-ply yarns used on the selvage may be made of finer count than those in the body of the cloth.)

3.4.3 Weave. The weave for all types and classes of the finished cloth shall be a 2-up and 2-down, 4 harness right twill (see 4.5).

3.4.4 Mothproofing. The wool fiber shall be mothproofed in accordance with MIL-DTL-43665.

3.5 Color. The color of the cloth shall be as specified in the contract or purchase order (see 6.2 and 6.4). The color shall match the standard sample (see 6.3). The color shall be applied in stock or top form. Speck dyeing shall be prohibited.

3.5.1 Visual shade matching. The color and appearance of the dyed cloth shall match the standard sample when tested as specified in 4.5.

3.5.2 Colorfastness. Unless otherwise specified in the contract or procurement documents, the finished cloth shall conform to the colorfastness requirements listed below in Table I when tested as specified in 4.5.

TABLE I. Colorfastness requirements.

Colors Evaluation	Light (after 80 AFU or 340 kJ/(m^2nm)@420 nm) 1/ (min.)	Perspiration (Acid & Alkaline) (Color Change and Staining) (min.)	Dry cleaning (Color Change and Staining) (3 cycles) (min.)	Heat -Dry (sublimation) (Color Change and Staining) 2/ (min.)	Crocking (Dry/Wet) (min.)
All colors	3-4	3-4	3-4	3-4	3.5

1/ AFU: AATCC Fading Units
2/ Temperature shall be 325 (±6)ºF

3.6 Physical requirements. The finished cloth shall conform to the requirements specified in Table II when tested as specified in 4.5.

TABLE II. Physical requirements.

Type	Class	Weight, oz/yd^2. (min.)	Wool grade, (min.)	Yarn ply, (min.)		Yarns per inch, (min.)		Breaking strength, lbs (min.)		Dimensional change, % (max.) 1/	
				Warp	Filling	Warp	Filling	Warp	filling	Warp	Filling
I	1	11.6	60’s	2	2	68	54	110	100	4.0	2.5
I	2	10.3	60’s	2	1	70	54	100	80	4.0	2.5
I	3	10.3	64’s	2	2	68	64	100	90	4.0	3.0
I	5	9.7	62’s	2	2	70	58	100	80	5.0	3.0
I	7	7.7	64’s	2	2	74	70	80	70	5.0	3.0
I	8	7.7	64’s	2	2	70	62	80	70	5.0	3.0
II	1	11.6	60’s	2	1	66	52	135	120	4.0	2.5
II	2	10.3	60’s	2	1	70	54	120	110	4.0	2.5
III	1	9	64’s	2	1	78	55	175	130	4.0	3.0
III	2	7.7	64’s	2	2	74	68	150	125	4.0	3.0
III	3	7.3-7.9	64’s	2	2	78	68	140	125	2.0	2.0
III	4	6.1	64’s	2	2	78	68	115	85	3.0	2.5

1/ The dimensional changes requirement refers to both shrinkage (-) and growth (+).

3.7 Finishing and final appearance. The cloth shall be fulled, sheared, and finished to provide stability of both color and finish appearance to match the standard sample (see 6.3 and 6.3.1).

3.7.1 Pilling. The Type III finished cloth shall show pilling not lower than a rating of "3" when tested as specified in 4.5.

3.7.2 pH. The pH of the finished cloth shall be between 5.5 and 8.5 inclusive when tested as specified in 4.5.

3.8 Width. For Government procurements only, the width of the finished cloth shall be as specified in the contract or purchase order (see 6.2) and shall be the minimum acceptable width exclusive of the selvage.

3.9 Length and put-up. For Government procurements only, 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 full width on a roll as specified in 5.1.

3.10 Wool content identification label. Each roll of the finished cloth shall be labeled or ticketed for wool/fiber content in accordance with the Rules and Regulations Under the Wool Products Labeling Act and the U.S. Standard for Grades of Wool.

3.11 Face identification. The warp side shall be identified as the face side by stamping that side with the word "FACE" at each end of the roll.

3.12 Toxicity. The finished cloth shall not present a health hazard and shall show compatibility with prolonged, direct skin contact when tested as specified in 4.7. Chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens shall not be used.

3.13 Workmanship. The finished cloth shall be uniform in quality and shall conform to the quality of product established on this specification. The occurrence of defects as specified in 4.3 and 4.4, shall not exceed the quality acceptance levels as specified in the contract or purchase order.

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. A first article, submitted in accordance with 3.1, shall be inspected, examined for appearance, color and finished defects listed in 4.4 and tested for the characteristics as specified in 4.5.

4.3 Conformance inspection. Conformance inspection shall include the visual examination of 4.4 and the tests of 4.5 through 4.7 as applicable. Sampling for inspection shall be performed in accordance with ASQ/ANSI Z1.4 and with acceptance quality limits (AQLs) as specified in the contract and/or order, except where otherwise indicated (see 6.2).

4.3.1 Inspection conditions. Unless otherwise specified in this specification or applicable procurements documents (see 6.2), all inspections shall be performed in accordance with this specification and all the requirements of referenced documents.

4.4 Visual examination. Each roll in the sample shall be examined yard-by-yard on the face side for defects in accordance with MIL-STD-655.

4.4.1 Limits of slubs and knots. Only slubs and knots which exceed "D" for slubs and "C" for knots shall be scored.

4.4.2 Roll identification and marking (face) examination. During the yard-by-yard examination, each roll in the sample shall be examined for defects as specified in MIL-STD-655.

4.4.3 Shade, finish and appearance examination. During the yard-by-yard examination, each roll in the sample shall be examined for shade variation as specified in MIL-STD-655.

4.4.4 Length examination. For Government procurements only, during the yard-by-yard examination, each roll in the sample shall be examined for length as specified in MIL-STD-655.

4.5 End item testing. The cloth shall be tested for the characteristics listed in Table III. The methods of testing as specified wherever applicable and as listed in Table III shall be followed. All test reports shall contain the individual values utilized in expressing the final results. The sample unit shall be 3-1/2 continuous yards full width of the finished cloth for all physical and chemical tests. The lot shall be unacceptable if one (1) or more tests fail to meet the requirement specified. 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:		
Wool (Type I)	See 3.4.1.1	AATCC TM20A (see 6.6)
Nylon and wool (Type II)	See 3.4.1.2	AATCC TM20A (see 6.6)
Polyester and wool (Type III)	See 3.4.1.3	AATCC TM20A (see 6.6)
Weave	See 3.4.3	Visual 1/
Mothproofing	See 3.4.4	2/
Visual shade matching	See 3.5.1	See 4.6.1
Colorfastness:		
Crocking	Table I	AATCC TM8 3/
Perspiration	Table I	AATCC TM15 4/
Light	Table I	AATCC TM16.3, Opt 2A 5/
Dry heat	Table I	AATCC TM117 4/
Dry cleaning	Table I	AATCC TM132 4/
Weight	Table II	ASTM D3776/D3776M, Option C
Yarn ply:	Table II	Visual 1/
Warp		
Filling		
Yarns per inch	Table II	ASTM D3775
Breaking strength	Table II	ASTM D5034
Dimensional change	Table II	AATCC TM158
Pilling (Type III)	See 3.7.1	ASTM D3511/D3511M
pH	See 3.7.2	AATCC TM81
Toxicity	See 3.12	See 4.7

1/ One determination per sample unit and the test results reported as “pass” or “fail”.
2/ The test for mothproofing compounds shall be specified in MIL-DTL-43665.
3/ Rated using the AATCC EP8, Evaluation Procedure for AATCC 9-Step Chromatic Transference Scale.
4/ Rated using the AATCC EP1, Evaluation Procedure for Gray Scale for Color Change and AATCC EP2, Evaluation Procedure for Gray Scale for Staining.
5/ Rated using the AATCC EP1, Evaluation Procedure for Gray Scale for Color Change.

4.6 Methods of testing and inspection.

4.6.1 Visual shade matching. The color and appearance of the cloths shall match the standard sample when viewed using the AATCC EP9, Evaluation Procedure for Visual Assessment of Color Difference of Textiles, Option C (see 6.5), with sources simulating artificial daylight D_{75} illuminant with a color temperature of 7500 (± 200) K illumination of 100 (± 20) foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2856 (± 200) K.

4.7 Toxicity test. When required, (see 6.2) an acute dermal irritation study and a skin sensitization study shall be conducted. When the results of these studies indicate the material is not a sensitizer or irritant, a Repeat Insult Patch Test shall be performed in accordance with the Modified Draize Procedure (see 2.3). If toxicity requirement (see 3.12) can be demonstrated with historical use data, on the finishing treatments used, toxicity testing may not be required (see 6.2).

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 materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Department 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 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. The specific issue of individual documents referenced (see 2.0)
d. When first article is required (see 3.1)
e. Color required (see 3.4 and 6.4)
f. Width of cloth required (see 3.8)
g. Length required if other than specified (see 3.9)
h. When toxicity testing is required (see 3.12)
i. Conformance inspection acceptance quality limits (AQLs) (see 4.3)
j. Inspection conditions (see 4.3.1)
k. Packaging (see 5.1)

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

6.3.1 Finish. The finish appearance of this cloth is critical. The contractor is cautioned to insure that the amount of twist of 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 6.3).

6.4 Colors, types and classes of cloth by the Services. The following are some of the colors of cloth required by the Services:

Service	Color	Type	Class	Weight (oz./yd²)
Army	Olive Green 108	I	1	11.6
	Army Green 44	I or II	2	10.3
	Army Green 44	I	5	9.6
	Army Green 44	I	7	7.7
	Army Green 44	I	8	7.7
	Army Green 489	III	1	9.0
	Army Green 489	III	2	7.7
	Army Green 489	III	3	7.3
	Army Blue 450	III	4	6.1-6.8
	Army Blue 451	III	4	6.1-6.8
Navy	Blue 3346	I	3	10.3
	Blue 3346	I	5	9.6
	Blue 3346	I	7	7.7
Coast Guard	Blue 3362	III	3	7.3-7.9
Marine Corps	Green 2234	I	5	9.6
	Green 2207	I	8	7.7
	Blue 2305	I	8	7.7
Air Force	Blue 1620	III	4	6.1

6.5 Visual shade matching. In 2019, Option A of AATCC EP9, Evaluation Procedure for Visual Assessment of Color Difference of Textiles 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 (± 5°) angle relative to the horizontal. The observer will view the specimens at a 90° angle, relative to the plane of the specimens.

6.6 Certificate of compliance. The contracting activity may select to accept a certificate of compliance for stated requirement.

6.7 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

6.8 Subject term (key word) listing.

Dress
Fabric
Mothproofing
Uniform

Custodians:
Army – GL
Navy - NU
Air Force - 11

Preparing Activity:
DLA-CT

Review activities:
Navy – CG1, MC

(Project: 8305-2020-024)

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 ASSIST Online database at https://assist.dla.mil/.