

MIL-Y-16654D

26 January 1973

SUPERSEDING

MIL-Y-16654C

23 May 1966

## MILITARY SPECIFICATION

## YARN, WOOL

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

## 1. SCOPE

1.1 Scope. This specification covers worsted yarn.

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

Type I - White or dyed

Type II - Natural

## 2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

## SPECIFICATIONS

## FEDERAL

UU-P-268	- Paper, Kraft, Untreated, Wrapping
PPP-B-636	- Boxes, Shipping, Fiberboard
PPP-B-676	- Boxes, Setup

## STANDARDS

## FEDERAL

FED-STD-191	- Textile Test Methods
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## MILITARY

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes
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FSC 8310

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MIL-STD-129 - Marking for Shipment and Storage

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

PUBLICATIONS

U.S. Department of Agriculture

Methods of Test for Grades of Wool Top

(Application for copies should be addressed to the U.S. Department of Agriculture, Agricultural Marketing Service, Washington, D.C. 20402.)

Rules and Regulations Under the Wool Products Labeling Act of 1939

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.)

- \* 2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Motor Freight Traffic Association, Inc., Agent

National Motor Freight Classification

(Application for copies should be addressed to the American Trucking Associations, Inc., Tariff Order Section, 1616 P Street, N.W., Washington, D.C. 20036.)

Uniform Classification Committee, Agent

Uniform Freight Classification

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

3. REQUIREMENTS

3.1 Standard sample. The finished yarn for type I shall match the standard sample for shade and shall be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.3).

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### 3.2 Material.

3.2.1 Stock. The wool top shall be fleece wool, pulled wool, or any combination thereof not lower in grade than 56's U.S. Standard. The use of noils or laps is prohibited.

3.2.2. Yarn. The yarn shall be spun on the worsted system from combed top on either the Bradford, French or American system.

3.2.2.1 Yarn construction. The yarn shall be not finer than 8's four ply or coarser than 7's four ply. The twist shall be soft with 5 ( $\pm$  5 percent) turns per inch in the single yarn and 2 ( $\pm$  5 percent) turns per inch in the ply yarn, when tested as specified in 4.4.

### 3.3 Color.

3.3.1 Type I, white or colored. The color of the finished yarns shall be as specified (see 6.2) and shall match the standard sample (see 6.3). When white is specified, the yarn shall be bleached using hydrogen peroxide. Unless otherwise specified, white yarn shall not be treated with an optical bleach. However, in the event that the use of an optical bleach is specified or permitted, (see 6.2) the optical bleach shall be so selected that the finished yarn shall show no discoloration from light after exposure for 20 standard fading hours followed by 48 hours in the dark, when tested as specified in 4.4.

3.3.1.1 Type II, natural. The yarn shall be in the natural condition, undyed, unbleached and not subjected to any chemical processes.

3.3.2 Matching, type I. The color of the finished yarn shall match the standard sample under natural (north sky) daylight or artificial daylight having a color temperature of 7500° Kelvin and shall be a good approximation to the standard sample under incandescent lamplight at 2800° Kelvin.

3.3.3 Colorfastness, type I. The dyed and finished yarn shall show fastness to laundering and to light equal to or better than the standard sample. When no standard sample has been established or designated as applicable to colorfastness, the finished yarn shall show "good" fastness to laundering and to light. Tests shall be made as specified in 4.4.

\* 3.4 Put-up, types I and II. Unless otherwise specified (see 6.2), the yarn shall be put-up in 4.0 ounce skeins  $\pm$  10 percent (see 4.2.3.2.1). The average weight per skein, on a lot basis, shall be not less than 4.0 ounces (see 4.2.3.2.2).

3.5 Wool content. The finished yarn shall contain not less than 95 percent wool based on the dry weight of the desized specimen when tested as specified in 4.4.

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3.6 Wool content label. Yarn manufactured under this specification shall be labeled in accordance with the Wool Products Labeling Act of 1939.

3.7 Workmanship. The finished yarn shall conform to the quality and grade of product established by this specification. The occurrence of defects shall not exceed the applicable acceptable quality levels.

#### 4. QUALITY ASSURANCE PROVISIONS

- \* 4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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

- \* 4.2 Quality conformance inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated hereinafter.

4.2.1 Component and material inspection. In accordance with 4.1 above, components and materials shall be tested in accordance with all the requirements of referenced specifications, drawings and standards unless otherwise excluded, amended, modified or qualified in this specification or applicable purchase documents.

4.2.1.1 Wool. The wool shall be visually examined for grade (see 3.2.1) in 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 top. The sample size (number of sample units) shall be as shown in table I. The lot size shall be expressed in units of one pound. The result from each sample unit shall be reported separately. The lot shall be unacceptable if a single sample unit fails to meet the required grade.

TABLE I

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

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4.2.2 In-process inspection. Inspection shall be made at any point or during any phase of the manufacturing process to assure that no noils or laps are used (see 3.2.1) and that the dyeing requirements have been adhered to (see 3.3). The Government reserves the right to exclude from consideration for acceptance any material for which in-process inspection has indicated nonconformance.

4.2.3 Examination of the end item. Examination of the end item shall be in accordance with 4.2.3.1 through 4.2.3.2.2.

4.2.3.1 Visual examination. Defects found during this examination shall be classified in accordance with the defects listed in table II and regardless of their proximity to each other, except where two or more defects represent a single local condition, in which case only the most serious defect shall be counted. The sample unit shall be one skein. The acceptable quality level (AQL) shall be 2.5 major defects and 10.0 total (major and minor combined) defects per 100 units. The sample size shall be in accordance with inspection level S-1. The lot size shall be expressed in units of one skein.

TABLE II. Classification of defects

Examine	Defect	Classification	
		Major	Minor
Appearance and workmanship	Cut, any	X	
	Chafed or damaged affecting serviceability	X	
	Put-up other than specified	X	
	Improperly or not uniformly wound resulting in entangling during unwinding or otherwise affecting free unhampered unwinding of the skein.	X	
Color	Other than specified	X	
	Off shade, i.e., not within established tolerance		X
Cleanness	Spot or stain <u>1/</u>		X
	Lumps <u>1/</u>		X
	Objectionable odor		X
Identification (fiber)	Not labeled in accordance with		
	Wool Products Labeling Act of 1939		X

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

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4.2.3.2 Examination for weight.

4.2.3.2.1 Individual skein. A defect with regard to weight shall be considered to exist if the net weight of any one skein is not within the range specified in 3.4. The inspection level shall be S-3. The AQL shall be 4.0 defects per 100 units. For lots consisting of 500 or fewer units, the sample size shall be 10 and the acceptance number 1. The lot size shall be the number of units in the inspection lot.

4.2.3.2.2 Average weight. A lot shall be unacceptable if the average weight is less than the specified weight. The tolerance of plus or minus 10 percent allowed per individual skein shall not apply to the average weight (see 3.4).

4.3 Examination of preparation for delivery requirements. An examination shall be made to determine that the packaging, packing and marking complies with the section 5 requirements. Defects shall be scored in accordance with the list below. The sample unit shall be one shipping container fully prepared for delivery with the exception that it need not be closed. Defects of closure listed below shall be examined on shipping containers fully prepared for delivery. The lot size shall be the number of shipping containers in the end item inspection lot. The inspection level shall be S-2 and the AQL shall be 2.5 defects per 100 units.

<u>Examine</u>	<u>Defect</u>
Marking (exterior and interior)	Omitted; incorrect; illegible; of improper size, location, sequence or method of application.
Materials	Any component missing, damaged or not as specified.
Workmanship	Inadequate application of components, such as: incomplete closure of container flaps, loose strapping, inadequate stapling or improper taping. Bulged or distorted container. Open and non-continuous heat sealed seams and closure of polyethylene bag. Omission of vent hole in polyethylene bag. Incorrectly fabricated bag.
Preservation	Preservation improper, improperly applied or missing. <u>1/</u>
Content	Number of skeins per package is more or less than required. <u>1/</u>

1/ For this defect one package shall be examined from each shipping container in the sample.

- \* 4.4 Tests. The methods of testing specified in FED-STD-191, wherever applicable, 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 methods. The sample unit shall be 2 skeins. The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified. The lot size shall be expressed in units of one skein. All test reports shall contain the individual values utilized in expressing the final result. The sample size (number of sample units) shall be in accordance with the following:

<u>Lot size (skeins)</u>	<u>Sample size</u>
800 or less	2
801 up to and including 22,000	3
22,001 and over	5

TABLE III

<u>Characteristic</u>	<u>Requirement paragraph</u>	<u>Test method</u>
Yarn number	3.2.2.1	1/
Twist ply yarn	3.2.2.1	1/
Hydrogen peroxide bleach	3.3.1	1/
Optical bleach (when applicable)	3.3.1	5660
Colorfastness to:		
Light	3.3.3	5660
Laundering	3.3.3	5614
Wool content	3.5	2101

- 1/ A certificate of compliance shall be submitted and will be acceptable for the stated requirements.

## 5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A or C as specified (see 6.2).

### 5.1.1 Level A.

5.1.1.1 Type I. Twenty skeins of yarn of one color only, individually secured with a paper band, shall be packaged in a snug-fitting paperboard box conforming to type II, variety 1, class A, style 3 or 4 of PPP-B-676. The depth of the lid shall be 1 inch. Each box shall be closed in accordance with the appendix of the box specification.

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- \* 5.1.1.2 Type II. Four skeins of yarn shall be inserted in a snug-fitting clear polyethylene film bag of 0.00125 inch thickness ( $\pm$  25 percent tolerance). The polyethylene bag shall be formed with heat sealed seams that are straight, continuous and parallel to each other and the formed edges of the bag. Closure of the polyethylene bag shall be accomplished by a heat seal or mechanical tie. The bag may be fabricated from polyethylene film tubing or sheeting. A 1/4 inch diameter hole shall be made at one corner of each bag to allow the excess air to escape.
- 5.1.2 Level C. Yarn shall be packaged to afford adequate protection against physical damage during shipment from the supply source to the first receiving activity. The supplier may use his standard practice when it meets this requirement.
- 5.2 Packing. Packing shall be level B or C as specified (see 6.2).
- \* 5.2.1 Level B. Yarn of one type and color only, packaged as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC, type CF (variety SW) or SF, class domestic, grade 275 of PPP-B-636. For type II yarn, each container shall have the contents completely covered on the top and bottom with a sheet of 30-pound minimum basis weight kraft paper conforming to grade B of UU-P-268. Each shipping container shall be closed in accordance with method II of the appendix of the container specification. The weight of the contents of each shipping container shall not exceed 65 pounds.
- \* 5.2.2 Level C. Yarn, packaged as specified in 5.1, shall be packed in a manner to insure carrier acceptance and safe delivery at destination at the lowest transportation rate for such supplies. Containers shall be in accordance with Uniform Freight Classification Rules or National Motor Freight Classification Rules, as applicable.
- 5.3 Marking. In addition to any special marking required by the contract or order, interior packages and shipping containers shall be marked in accordance with MIL-STD-129.
- \* 5.3.1 Polyethylene bagged packages. Polyethylene bagged packages shall have the required identification information legibly printed or stamped in black directly on the bag across the center face or on a white paper label inserted within the bag so as to permit ready identification.

## 6. NOTES

### 6.1 Intended use.

Type I. Type I yarn is intended for use in hand weaving and textile work in occupational therapy.

Type II. Type II yarn is intended for use for lubricating purposes.



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6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type required (see 1.2).
- (c) Color required (see 3.3).
- (d) When optical bleach is permitted (see 3.3.1).
- (e) Put-up required if other than specified (see 3.4).
- (f) Selection of applicable levels of packaging and packing (see 5.1 and 5.2).

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

6.4 The standard shade samples have been dyed with the following formulations: This is for information and is not mandatory.

<u>Shade</u>	<u>Formulation</u>
Black #259	Acid Black #24, C.I. 26370
Light Delft Blue #253	Acid Blue #45, C.I. 63010 Acid Red #1, C.I. 18050
Carmine #254	Acid Red #92, C.I. 45410 Acid Orange #10, C.I. 16230 Acid Red #18, C.I. 16255 Acid Blue #45, C.I. 63010
Light Taupe #271	Acid Blue #45, C.I. 63010 Acid Red #37, C.I. 17045 Acid Yellow #17, C.I. 18965
Medium Leaf Green #256	Acid Orange #10, C.I. 16230 Acid Blue #45, C.I. 63010 Acid Yellow #23, C.I. 19045
Scarlet #257	Acid Red #18, C.I. 16255 Acid Red #1, C.I. 18050
White #258	Bleached with hydrogen peroxide only.

6.5 Marginal notations. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience

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only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and suppliers are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - GL  
Navy - SA

Preparing activity:

Army - GL

Project No. 8310-0082

Review activity:

Army - MD

<b>SPECIFICATION ANALYSIS SHEET</b>		Form Approved Budget Bureau No. 22-R255
<b>INSTRUCTIONS:</b> This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.		
<b>SPECIFICATION</b> <div style="text-align: center; margin-top: 10px;">Yarn, Wool MIL-Y-16654D</div>		
<b>ORGANIZATION</b> <div style="height: 20px; border: 1px solid black;"></div>		
<b>CITY AND STATE</b> <div style="height: 20px; border: 1px solid black;"></div>	<b>CONTRACT NUMBER</b> <div style="height: 20px; border: 1px solid black;"></div>	
<b>MATERIAL PROCURED UNDER A</b> <input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
<b>1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?</b> <b>A. GIVE PARAGRAPH NUMBER AND WORDING.</b> <div style="height: 80px; border: 1px solid black;"></div>		
<b>B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES</b> <div style="height: 150px; border: 1px solid black;"></div>		
<b>2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID</b> <div style="height: 60px; border: 1px solid black;"></div>		
<b>3. IS THE SPECIFICATION RESTRICTIVE?</b> <input type="checkbox"/> YES <input type="checkbox"/> NO (If "yes", in what way?) <div style="height: 60px; border: 1px solid black;"></div>		
<b>4. REMARKS</b> (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity) <div style="height: 60px; border: 1px solid black;"></div>		
<b>SUBMITTED BY</b> (Printed or typed name and activity - Optional) <div style="height: 20px; border: 1px solid black;"></div>		<b>DATE</b> <div style="height: 20px; border: 1px solid black;"></div>

DD FORM 1426  
1 JAN 66

REPLACES EDITION OF 1 OCT 64 WHICH MAY BE USED.