

INCH-POUND

V-T-285F

January 3, 1991

SUPERSEDING

V-T-285E

August 21, 1986

FEDERAL SPECIFICATION

THREAD, POLYESTER

This specification is approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers polyester thread used for machine sewing (see 6.1).

1.2 Classification.

1.2.1 Types and classes. The thread shall be furnished in the following types, classes, and subclasses, as specified (see 6.2):

Types:

- I - Twisted soft multiple cord.
- II - Twisted bonded multiple cord.
- III - Bonded monocord.
- IV - Soft air entangled.
- V - Bonded air entangled.

Classes:

- Class 1 - Normal elongation.
- Class 3 - Heat stable - low shrinkage.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: U.S. Army Natick Research, Development and Engineering Center, Natick, MA 01760-5019 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 8310

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1.1.2.1.1

Subclasses:

- Subclass A - General purpose (see 1.2.1.1).
- Subclass B - Nonwicking finish (see 3.8.1, 6.1, and 6.6).
- Subclass C - No finish (see 6.5).

1.2.1.1 Subclass references. In end item specifications where neither subclass designation "A", "B" or "C" is indicated, the requirements for subclass "A" shall apply.

2. APPLICABLE DOCUMENTS

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

Federal Specifications:

- PPP-P-50 - Packaging and Packing of Thread for Domestic and Overseas Shipment

Federal Standards:

- FED-STD-191 - Textile Test Methods

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-0001.)

(Single copies of this specification, other Federal specifications, and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.)

(Federal Government activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards and Commercial Item Descriptions from established distribution points in their agencies.)

Military Standards:

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

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(Copies of military specifications and standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting activity.)

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.

American Society for Testing and Materials (ASTM)

D 204 - Standard Methods of Testing Sewing Threads

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

(Technical society and technical association documents are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Government and supply purchase. The requirements specified in 3.7.2, 3.9, 3.10, section 5, and the related provisions of section 4 apply only to thread purchased directly by the Government. All other requirements apply both to thread purchased by a supplier as a component for an end item and to thread purchased directly by the Government.

3.2 Standard sample. When a standard sample is available, the thread shall match the standard 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).

3.3 Materials.

3.3.1 Yarn. The yarn for all types shall be continuous multifilament polyester (polyethylene glycol terephthalate) having a specific gravity within the range 1.36 to 1.40 when tested as specified in 4.2.3.

3.3.2 Bonding agent. The bonding agent used in types II, III and V thread shall be colorless.

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3.4 Color. The color (shade) shall be as specified in the applicable end item specification or in the contract or purchase order (see 6.2).

3.4.1 Matching. The shade of the thread shall match the approved shade standard (see 6.3) when viewed under filtered tungsten lamps which approximate artificial daylight having a correlated color temperature of 7000 ± 500 K, with illumination of 100 ± 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2300 ± 100 K. When end item use of the thread is not known, thread sizes B or finer shall be evaluated for shade matching after removal of finish. Thread to be used for dry-cleanable wool or dry-cleanable wool blend clothing or in end items requiring dry cleaning shall be evaluated for shade matching after removal of finish. Removal of finish from thread when required, shall be as specified in 4.3.1.1.

3.4.2 Colorfastness. The colorfastness of dyed and finished thread shall be as specified in the applicable end item specification or as set forth in the contract or purchase order (see 6.2 and 6.4), except that when colorfastness requirements are not stated or not referenced to a standard sample, the thread shall show "good" colorfastness to laundering (after 3 cycles), perspiration, and light and the thread shall have a "good" colorfastness to dry heat for both color change and color transfer. When a standard sample for colorfastness is referenced, the thread shall be equal to or better than the standard sample for the specified colorfastness properties or (when properties are not specified) for colorfastness to laundering (after 3 cycles), perspiration, light, and dry heat. Tests for colorfastness (including wet drycleaning and weathering when specified) shall be as specified in 4.2.3, as applicable.

3.5 Construction.

3.5.1 Type I. Type I thread shall be of twisted, multiple cord (ply) construction. Each of the individual plies shall be twisted initially with not less than the number of turns per inch (t.p.i.) to be used in the final twist, and in the opposite direction to the final twist (see 3.6). The final plied twist shall be not less than the applicable minimum t.p.i. specified in 3.7. Type I thread shall be unbonded, with a soft finish.

3.5.2 Type II. Type II thread shall have the same construction as type I, except that the type II thread shall be bonded.

3.5.3 Type III. Type III thread shall be essentially a single ply, monocord construction. Constituent yarns before combining shall contain only original producers twist and the final twist shall be no more than 5 t.p.i. Type III thread shall be bonded to unite all the filaments to form a smooth even monocord.

3.5.4 Type IV. Type IV thread shall be composed of one or more constituent yarns which are air entangled together by the manufacturing process to form a single ply thread with a final twist of no more than 10 t.p.i. (see 3.6).

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3.5.5 Type V. Type V thread shall have the same construction as type IV, except that the type V thread shall be bonded.

3.6 Twist direction. Unless otherwise specified (see 6.2), the direction of the final twist shall be "Z" except that number sizes of types I and II threads when used for sole stitching of footwear may be "S" or "Z" depending upon the initial twist when tested as specified in 4.2.3.

3.7 Physical requirements. The finished thread shall conform to the applicable requirements for the specified type, class, and size (letter or number) set forth in table I through table VI when tested as specified in 4.2.3.

TABLE I. Type I, class 1 thread requirements

Letter size	Nominal tex size	Plies	Final twist (t.p.i.) min.	Length per (yards) min.	Breaking strength (pounds) min.	Elongation (percent) min. max.
OO	16	2	12.0	26,500	1.4	26
A	24	2 or 3	10.0	17,600	2.0	26
AA	35	2, 3 or 4	9.0	13,200	3.0	26
B	50	2 or 3	7.0	8,500	4.3	26
E	70	3	6.0	5,700	8.0	26
F	90	4	5.0	4,200	10.6	26
FF	150	3	4.0	2,600	16.0	26
Number size						
3	210	3	5.0	1,800	24	26
4	300	3	4.0	1,370	32	26
5	350	3	4.0	1,120	40	26
6	450	3	3.0	900	48	26
7	500	3	3.0	780	54	26
8	600	3 or 5	3.0	680	60	26
10	700	3 or 6	2.5	590	70	26

TABLE II. Type I, class 3 thread requirements

Letter size	Nominal tex size	Plies	Final twist (t.p.i.) min.	Length per (yards) min.	Breaking strength (pounds) min.	Elongation (percent) min. max.
OO	16	2	12.0	21,200	1.25	15 35
A	24	2 or 3	10.0	13,650	1.90	15 35
B	50	2 or 3	7.0	7,000	3.80	15 35
E	70	3	6.0	4,550	6.80	15 35
F	90	4	5.0	3,500	7.60	15 35
FF	150	3	4.0	2,300	16.00	15 35

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TABLE II. Type I, class 3 thread requirements (cont'd)

Letter size	Nominal tex size	Plies	Final twist (t.p.i.) min.	Length per (yards) min.	Breaking strength (pounds) min.	Elongation (percent) min. max.	
Number size							
3	210	3	5.0	1,450	19.00	15	35
4	300	3	4.0	910	27.25	15	35
5	350	3	4.0	700	34.00	15	35
6	450	3	3.0	600	41.00	15	35
7	500	3	3.0	515	47.70	15	35

TABLE III. Type II, class 1 thread requirements

Letter size	Nominal tex size	Plies	Final twist (t.p.i.) min.	Length per (yards) min.	Breaking strength (pounds) min.	Elongation (percent) min. max.	
OO	16	2	12.0	23,800	1.5		26
A	24	2 or 3	10.0	15,800	2.3		26
AA	35	2, 3 or 4	9.0	11,900	3.0		26
B	50	2 or 3	7.0	7,600	4.5		26
E	70	3	6.0	5,100	8.0		26
F	90	4	5.0	3,800	10.6		26
FF	150	3	4.0	2,300	16.0		26
Number size							
3	210	3	5.0	1,620	25		26
4	300	3	4.0	1,230	34		26
5	350	3	4.0	1,010	42		26
6	450	3	3.0	810	48		26
7	500	3	3.0	700	54		26
8	600	3 or 5	3.0	630	60		26
10	700	3 or 6	2.5	550	70		26

TABLE IV. Type III, class 1 thread requirements

Letter size	Nominal tex size	Ply	Length per pound (yards) min.	Breaking strength (pounds) min.	Elongation (percent) min. max.	
OO	16	1	23,800	1.4		26
A	24	1	15,800	2.6		26
AA	35	1	11,900	3.0		26
B	50	1	7,600	5.3		26

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TABLE IV. Type III, class 1 thread requirements (cont'd)

Letter size	Nominal tex size	Ply	Length per pound (yards) min.	Breaking strength (pounds) min.	Elongation (percent) max.
E	70	1	5,100	8.0	26
F	90	1	3,800	10.6	26
FF	150	1	2,300	16.0	26
Number size					
3	210	1	1,620	24	26
4	300	1	1,230	32	26
5	350	1	1,010	40	26
6	450	1	810	48	26
7	500	1	700	54	26
8	600	1	610	60	26
10	700	1	550	70	26

TABLE V. Type IV, soft air entangled thread requirements

Number size	Ply	Length per pound (yards)		Breaking strength (pounds) min.	Elongation (percent) max.
		min.	max.		
16	1	25061	28180	1.0	26
21	1	18791	21430	1.4	26
24	1	16701	18790	1.6	26
27	1	15031	16700	1.8	26
30	1	12881	15030	2.0	26
40	1	9841	11070	2.8	26
50	1	7381	8860	3.6	26
60	1	6101	7120	4.3	26
80	1	4751	5350	5.4	26
90	1	4071	4750	5.9	26
105	1	3561	4070	6.9	26

TABLE VI. Type V, bonded air entangled thread requirements

Number size	Ply	Length per pound (yards)		Breaking strength (pounds) min.	Elongation (percent) max.
		min.	max.		
16	1	23561	26500	1.0	26
21	1	17661	20180	1.4	26
24	1	15701	17660	1.6	26
27	1	14131	15700	1.8	26
30	1	12101	14130	2.0	26

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TABLE VI. Type V. bonded air entangled thread requirements (cont'd)

Number size	Fly	Length per pound (yards)		Breaking strength (pounds) min.		Elongation (percent) max.	
		min.	max.				
40	1	9251	10400	2.8		26	
50	1	6941	8330	3.6		26	
60	1	5751	6700	4.3		26	
80	1	4471	5000	5.4		26	
90	1	3831	4470	5.9		26	
105	1	3351	3830	6.9		26	

3.7.1 Maximum length per pound (types I, II and III only). The maximum length per pound of any stated size of thread shall be the specified minimum of the next finer size thread of the same type and number of plies. The maximum length per pound of the finest size of threads listed in each table shall be not more than 12-1/2 percent above the minimum specified.

3.7.2 Knots. Size FF and finer thread shall average not more than one thread knot per 2 ounces, and size 3 and heavier thread shall average not more than one thread knot per 4 ounces.

3.7.3 Shrinkage (class 3 only). The shrinkage of class 3 thread shall be not more than 3.0 percent, when tested as specified in 4.2.3.

3.8 Finish and bond. No chemical finishes or bonding agents shall be applied except those necessary to provide good sewing quality and as applicable for bonding types II, III and V. Finishes shall not transport or wick in any manner as to cause staining or discoloration of the sewn materials.

3.8.1 Nonwicking finish (subclass B). The subclass B thread shall be finished with an approved nonwicking finish uniformly applied. The nonwicking finish shall be approved by Natick pending Surgeon General clearance (see 6.6). The use of compounds containing mercury in any form is prohibited. The finished thread shall resist the wicking of water when tested as specified in 4.2.3.

3.9 Put-up. Unless otherwise specified (see 6.2), the thread shall be put-up on a nominal weight per holder basis on holders as specified in the contract or purchase order in accordance with table VII. When put-up on ready-made lockstitch bobbins is specified, the style of bobbin and the length of thread therein shall be in accordance with the contract or purchase order. The average weight per holder shall be not less than the specified nominal weight minus 3.0 percent tolerance when examined (on a 10-holder basis) as specified in 4.2.2. The thread shall be put-up in one continuous length per holder and shall be so wound that each turn and layer is free from entanglement.

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TABLE VII. Put-up

Thread type	Letter size and number size	Type of holder	Nominal net weight ounces (see 3.9)
I	All letter sizes	Single head spools	1
I, II, III	All letter sizes and number sizes 3, 4 and 5; and size 6 when speci- fied.	Single head plastic tubes	4, 8 and 16
I, II, III	Number sizes 6, 7, 8, 9 and 10; and sizes 3, 4 and 5 when specified.	Single head plastic tubes	8 or 16
IV, V	All number sizes	Spools, cones or tubes	8 or 16

3.10 Identification marking. Except when commercial identification markings are specified in the invitation for bid, each holder except the ready made lockstitch bobbins shall have a label attached in such a manner as to remain in place and be clearly legible until all thread has been removed. In the case of ready made lockstitch bobbins, the label shall be put on the outside of the unit pack (bulk pack). The label shall be printed with the information as specified below:

Nomenclature
National stock number
Weight (net)
Direction of twist
Color
Letter or number size and ply
Type and class
Contract or purchase order number
Date manufactured (month and year)
Name of contractor

For type I, class 3 thread, the date of manufacture of thread shall be included on the label.

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3.11 Workmanship. The finished thread shall conform to the quality established by this specification and the occurrence of defects shall not exceed the applicable acceptable quality levels.

4. QUALITY ASSURANCE PROVISIONS

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

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Certificates of compliance. When certificates of compliance are submitted, the Government reserves the right to inspect such items to determine the validity of the certification.

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

4.2.1 End item visual examination.

4.2.1.1 Thread on holder examination. Thread on holders shall be examined for the defects listed in table VIII. The lot size shall be expressed in units of holders except that for ready made bobbins, the lot size shall be expressed in units of one gross of bobbins. The sample unit shall be one holder except that for ready made bobbins the sample unit shall be one gross of bobbins. The inspection level shall be S-3 and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 1.5 for major defects and 4.0 for total (major and minor combined) defects.

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TABLE VIII. Thread on holder defects

Examine	Defect	Major	Minor
Identification label	Missing, incorrect, incomplete, illegible, or insecurely attached.		201
Type of holder	Other than specified.	101	
Surface condition	Loose ply.	102	
	Cut, tear, chafe, or slip, affecting strength of thread or interfering with easy location of end and initial unwinding.	103	
Cleanliness	Dirt, spot, or stain clearly noticeable.		202
Finish	Other than specified.		203
	Uneven, lumpy, bare, or thin spots.		204

4.2.1.2 Thread as unwound examination. The thread shall be examined while unwinding for the defects listed in table IX. All defects shall be counted regardless of their proximity to each other. The lot size shall be expressed in units of holders except that for ready made bobbins the lot size shall be expressed in units of one gross of bobbins. The sample unit shall be one holder except that for ready made bobbins the sample unit shall be one gross of bobbins. The inspection level shall be S-3 and the AQL, expressed in terms of defects per hundred units, shall be 1.5 for major defects and 4.0 for total (major and minor combined) defects.

TABLE IX. Thread as unwound defects

Examine	Defect	Major	Minor
Continuous length	Not in continuous lengths.		201
Knot and splices	Size FF and finer thread shall average not more than one thread knot per 2 ounces, and size 3 and heavier thread not more than one thread knot per 4 ounces.		202
Winding	Improperly or not firmly wound resulting in kinks, knots, or slippage during unwinding or otherwise affecting free unwinding of the thread.	101	

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TABLE IX. Thread as unwound defects (cont'd)

Examine	Defect	Major	Minor
Tackiness or adhesion	Strands adhere to each other or to holder affecting unwinding tension.		203
Color	Other than specified.	102	
	Uneven, apparent on successive layers or end to end.		204
Number of plies	Other than specified.	103	

4.2.2 Net weight per holder examination. The sample for this examination shall be 10 wound holders taken at random from the lot. The holders shall be weighed individually and the net weight of thread determined. The values obtained shall be averaged and this average shall represent the net weight per holder in the lot. The lot shall be unacceptable if the average net weight per holder is less than the specified weight minus the 3.0 percent tolerance (see 3.9).

4.2.3 End item testing. The end items shall be tested for the characteristics listed in table X. The methods of testing specified in FED-STD-191, wherever applicable, and as listed in table X shall be followed. The lot size shall be expressed in units of holders except that for ready made bobbins the lot size shall be expressed in units of one gross of bobbins. The sample unit shall be one holder or sufficient holders to provide enough thread for the applicable tests. The inspection level shall be S-1 and the AQL for each characteristic, expressed in terms of defects per hundred units, shall be 6.5 for test failures.

TABLE X. End item tests

Characteristic	Requirement paragraph	Test method
Polyester yarn:		
Identification	3.3.1	1600 <u>1</u> /
Specific gravity	3.3.1	1600 <u>1</u> /
Bright	3.3.1	Visual <u>1</u> /
Continuous multifilament	3.3.1	Visual <u>1</u> /
Shade match	3.4.1	4.3.1 <u>2</u> /
Colorfastness to:		
Laundering (after 3 cycles)	3.4.2	5610 <u>3</u> / <u>4</u> /
Perspiration	3.4.2	5680
Light	3.4.2	5660
Dry heat	3.4.2	5642 <u>5</u> /
Wet drycleaning	3.4.2	5622
Weathering	3.4.2	5671

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TABLE X. End item tests (cont'd)

Characteristic	Requirement paragraph	Test method
Twist (t.p.i.):		
Initial	3.5 and 3.7	4054 <u>1/</u> <u>6/</u>
Final	3.5 and 3.7	4054 <u>1/</u> <u>6/</u>
Direction of twist:		
Initial	3.6	4050
Final	3.6	4050
Number of plies	3.7	Visual <u>7/</u>
Length per pound	3.7	4010 <u>8/</u>
Breaking strength	3.7	4100 <u>9/</u>
Elongation	3.7	4100
Shrinkage (class 3)	3.7.3	4.3.2
Nonwicking (subclass B)	3.8.1	4504

- 1/ Unless otherwise specified, a certificate of compliance shall be submitted and will be acceptable for the stated requirement.
- 2/ In case of dispute, shade match shall be determined with finish. Procedures for removal of the finish shall be as specified in 4.3.1.1.
- 3/ The specimens must be dried after each of the 3 laundering cycles.
- 4/ The color transfer cloth evaluation shall not apply. No appreciable change in shade or loss of color of the tested specimen shall be visible when compared to the untested thread retained.
- 5/ The heat at which the specimen is to be tested shall be $351^{\circ} \pm 60^{\circ}\text{F}$.
- 6/ The test for turns per inch (t.p.i.) in the individual cords (strands) shall be made in conjunction with that for the final twist. After recording the final twist and while the individual cords (strands) are straight between the jaws, all cords but one shall be cut out and removed. The clamp shall then be opened, the slack drawn through, and the strand reset under the specified tension. The counter shall be reset to zero. The jaw shall then be rotated until all twist has been removed as determined by free passage of the needle between filaments. The t.p.i. shall be calculated in accordance with the general procedure of Method 4054.
- 7/ One determination per sample unit and the result reported as "pass" or "fail".
- 8/ In cases of dispute, the length per pound of the thread shall be determined using thread without finish. Procedure for the removal of finish shall be as specified in 4.3.1.1.
- 9/ Except that five determinations shall be made per sample unit.

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4.2.4 Packaging inspection. The inspection shall be in accordance with the quality assurance provisions of PPP-P-50.

4.3 Methods of inspection.

4.3.1 Shade match evaluation.

4.3.1.1 Removal of finish. When removal of finish is required (see 3.4.1), before evaluation for shade matching, the sample of thread shall be wet dry cleaned in accordance with Method 5622 of FED-STD-191 (disregarding references to the standard sample). Excess solvent shall be removed by centrifuging or wringing. The sample shall then be rinsed in distilled water at 120° to 160°F, and dried at a temperature not exceeding 180°F. The dried sample shall then be conditioned for a minimum of 4 hours prior to evaluation for shade match.

4.3.1.2 Shade matching procedure. The sample shall be wound or prepared for examination in a manner similar to that for the standard shade sample. The color of the sample shall match the standard sample when viewed under filtered tungsten lamps that approximate artificial daylight and that have a correlated color temperature of 7500 ± 200 K, with illumination of 100 ± 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2300 ± 200 K.

4.3.2 Heat stability shrinkage test (for class 3 thread only).

4.3.2.1 Preparation of specimens. The sample unit shall consist of five 14-inch test specimens. Each specimen shall be formed into a loop by knotting the ends together. Condition each specimen for a minimum of 4 hours at standard conditions as defined in FED-STD-191. Place the specimen on the hook of a vertical stand so that the knots rest on the hook. Take care that the loop does not twist upon itself. On the free end of the loop hang a metal hook (as specified in ASTM D 204) and the applicable weight as specified in table XI. While the loop is under tension, measure the length of the loop to the nearest 1 mm.

TABLE XI. Weight for heat stability shrinkage test

Thread letter size	Weight (ounces)
OO	1
A	1
B	1
E	2
F	2
FF	2

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TABLE XI. Weight for heat stability shrinkage test (cont'd)

Thread letter size	Weight (ounces)
Number size	
3	4
4	8
5	8
6	8
7	8

4.3.2.2 Test procedure. The previously measured specimens shall be tied and freely suspended from some stationary point inside an oven which has been preheated to 350°F. Specimens should remain inside the oven for 1 hour at 350° ± 5°F. Upon removal from the oven, the specimens shall be conditioned at standard conditions as defined in FED-STD-191 for a minimum of 4 hours, and the length of the loop shall be remeasured in the same manner as described in 4.3.2.1. The shrinkage shall be determined as a percent change from the original measured length and the average test result of the five specimens shall be reported to the nearest 0.1 percent.

5. PACKAGING

5.1 Preservation. Preservation shall be level A or Commercial, as specified (see 6.2).

5.1.1 Levels A and Commercial. The thread shall be preserved in accordance with the applicable requirements of PPP-P-50.

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

5.2.1 Levels A, B, and Commercial. The thread, preserved as specified in 5.1 shall be packed in accordance with the applicable requirements of PPP-P-50.

5.3 Marking. In addition to any special markings specified in the contract or purchase order, unit packs and shipping containers shall be marked in accordance with applicable provisions of PPP-P-50.

6. NOTES

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

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6.1 Intended use. The threads are intended for machine sewing of clothing, tentage, equipage, and footwear. The type I, class 3 (subclass A) thread is specifically intended for use in parachutes that are subject to exposure at elevated temperatures. Subclass B threads are intended for tentage, equipage, and other items where water resistance of seams is required, and are related to type I primarily in sizes B, E, F, FF, and 3.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Type, class, subclass, and letter or number size of thread required (see 1.2.1 and 3.7).
- c. Color (shade) required (see 3.4).
- d. Colorfastness properties required (see 3.4.2).
- e. Direction of twist, if other than specified (see 3.6).
- f. Put-up required (see 3.9).
- g. Levels of packaging and packing (see 5.1 and 5.2).

6.3 Sample. For access to samples, address the contracting activity issuing the invitation for bids or request for proposal, or as directed by the contracting activity.

6.4 Colorfastness guidelines. Normally, colorfastness requirements for thread are to be specified in keeping with those for the basic material into which the thread will be sewed (see 3.4.2). Typical examples are:

<u>Use</u>	<u>Colorfastness</u>
Thread for sewing wool clothing which is dry cleaned.	Good fastness to wet dry cleaning, perspiration, and light.
Thread for sewing wool clothing which is laundered.	Good fastness to laundering, perspiration, and light.
Thread for sewing cotton clothing which is laundered.	Good fastness to laundering and perspiration.
Thread for sewing synthetic fiber clothing which is laundered.	Good fastness to laundering, perspiration, and light.
Thread for sewing tentage.	Good fastness to weathering.
Thread for sewing footwear.	No colorfastness tests apply.
Thread for sewing equipage.	Good fastness to laundering and weathering.

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Inreed for sewing cotton polyester Good fastness to laundering, perspiration,
Blend fabrics for durable press and dry heat.
garments.

6.5 Subclass C. Subclass C thread covers the numbered sizes of thread used in footwear and other leather items which are waxed at the sewing machine and require that no sewing or other type finish be applied.

6.6 Finish. Approval of nonwicking finish for utilization under this specification is the responsibility of the U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5019 and is based on extensive tests, including those of toxicity and extensive rainroom evaluation in simulated tent form, which are not set forth in this specification. Because of the time necessary to conduct full evaluations, only those finishes already approved and so listed in the invitation for bids or request for proposal shall be considered acceptable for the related procurement (see 3.8.1).

6.6.1 Submittal for finish approval (subclass B thread). Request for approval of both the water-repellent treatment and the sewing finish should be submitted to the U.S. Army Natick Research, Development, and Engineering Center, ATTN: STRNC-ITFI. It should be accompanied by two spools approximately 4 ounces each after the nonwicking finish treatment and two spools approximately 4 ounces each containing both the nonwicking finish treatment and the sewing finish. The submitted samples should conform in all other respects to the requirements of this specification. Applicable test data and a list of the materials constituting the treatment and finish stipulating their grades and standards under solvents and manufacturer's name shall be furnished. The sample should be marked with a code, letters, or numbers, used to identify the thread shipped with the treatment and finish approved.

6.6.2 Formula disapproval (subclass B). For the information of the contractor, the use of proteins and their derivatives, starch, hydrophilic materials, oxidizing oils, oxidizing resins, and resin or compounds to increase hydro-scopicity may lead to formula disapproval.

6.7 Size conversion table.

Nominal tex number sizes	commercial ticket sizes
16	15
24	23
35	33
50	46
70	69
90	92
150	138
210	207

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Size conversion table. (cont'd)

<u>Nominal tex number sizes</u>	<u>commercial ticket sizes</u>
300	277
350	346
450	415
500	462
600	554
700	690

MILITARY INTERESTS:

Custodians

Army - GL
Navy - NU
Air Force - 11

Review Activities

Army - MD, EA
Air Force - 82, 99
DLA - CT
DNA - DS

User Activities

Army - AR
Navy - AS, MC, OS

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS
JUS - FPI
VA - OSS

Preparing Activity

Army - GL

(Project 8310-0174)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
V-T-285F

2. DOCUMENT DATE (YYMMDD)
1991 January 3

3. DOCUMENT TITLE

THREAD, POLYESTER

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)

7. DATE SUBMITTED (YYMMDD)

(1) Commercial

(2) AUTOVON

(If applicable)

8. PREPARING ACTIVITY

a. NAME

U.S. Army Natick RD&E Center

b. TELEPHONE (Include Area Code)

(1) Commercial
508-651-4532

(2) AUTOVON
256-4532

c. ADDRESS (Include Zip Code)

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: