

V-T-295E

August 1, 1985

SUPERSEDING

Fed. Spec. V-T-295D

February 3, 1977

FEDERAL SPECIFICATION

THREAD, NYLON

This specification is approved by the Assistant Administrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers nylon thread used for machine and hand-sewing (see 6.1).

1.2 Classification.

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

Types:

- I - Twisted multiple cord, soft finish
- II - Twisted multiple cord, bonded finish
- III - Monocord, bonded finish
- IV - Hand-sewing twist, waxed finish
- V - Buttonhole twist, hand-sewing (waxed)
- VI - Tailoring, twisted multiple cord, soft finish
- VII - Quilting thread, coreless cocoon bobbins and top thread, twisted multiple cord, soft finish

Classes:

- Class A - General purpose (see 1.2.1.1)
- Class B - Nonwicking (type I only)

1.2.1.1 Class references. In end item specifications where neither class designation "A" or "B" is indicated, the requirements for class "A" shall apply (see 6.2).

FSC 8310

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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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:

Federal Specifications:

- | | |
|----------|--|
| L-P-1183 | - Plastic Molding Material, Acrylonitrile-Butadiene-Styrene (ABS), Rigid |
| PPP-P-50 | - Packaging and Packing of Thread for Domestic and Overseas Shipment |

Federal Standard:

- | | |
|-------------|------------------------|
| 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.

(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; Houston, 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 Standard:

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

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

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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.

The Color Association of the United States

Department of Defense Standard Shades for Sewing Threads 1968

(Application for copies should be addressed to the Color Association of the United States, 343 Lexington Avenue, New York, NY 10016.)

American Society for Testing and Materials (ASTM)

- D 861 - Standard Recommended Practice for Use of the Tex System to Designate Linear Density of Fibers, Yarn Intermediates, Yarns, and Other Textile Materials
- D 2146 - Propylene Plastic Molding and Extrusion Materials
- D 3951 - Standard Practice for Commercial Packaging

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

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Government and supply purchase. The requirements specified in 3.7.1, 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 shall be bright, high tenacity continuous multifilament nylon. The nylon shall be a polyamide prepared from hexamethylene diamine and adipic acid or its derivatives, and shall have a melting point of not less than 472°F when tested as specified in 4.2.3.

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3.3.2 Bonding agent. The bonding agent used in types II and III thread, shall be a colorless nylon polymer (see 4.2.3).

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). Shade designations by letter (e.g. - Olive Drab S-1), and related cable numbers (e.g. C.A. 66022), refer to the DOD Standard Shade for Sewing Threads 1968 (see 2.2).

3.4.1 Visual color matching. The shade of the end item thread, after removal of finish when applicable, shall match the specified applicable shade standard (see 6.3), when tested as specified in 4.2.3.

3.4.2 Colorfastness. The colorfastness of dyed 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 6.5), except that when requirements are not stated or referenced to a standard sample for colorfastness, the thread shall show "good" colorfastness to laundering (after 3 cycles), wet drycleaning and light as specified. 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) wet drycleaning and light. Tests for colorfastness (including test for perspiration and weathering when specified) shall be as specified in 4.2.3 as applicable.

3.5 Construction. The construction of the thread shall be as specified below and in the number of plies as specified in 3.7, for the applicable type and size.

3.5.1 Type I. Type I thread shall be twisted multiple cord (ply) construction, unbonded with a soft finish. Each of the individual yarns 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.

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

3.5.3 Type III. Type III thread shall be essentially a single ply, monocord construction, bonded to unite all the yarns to form a smooth even monocord. Constituent yarns before combining shall contain only the original yarn producer's twist, and the final twist shall be no more than 4 t.p.i.

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3.5.4 Type IV. Type IV thread shall be twisted two-cord (ply) construction, unbonded with a wax finish (see 3.8). Each of the individual yarns shall be twisted initially with not less than the number of t.p.i. to be used in the final twist. The final twist shall be "S" and the thread shall be suitable for simulated hand-sewing done by machine.

3.5.5 Type V. Type V thread shall be of a twisted, three-cord (ply) construction, unbonded with a wax finish (see 3.8). Each of the individual plies shall be twisted initially with not less than the number of 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 suitable for hand-sewing.

3.5.6 Type VI. Type VI thread shall be multiple cord (ply) construction, soft finish. Each of the individual plies shall be twisted initially with not less than the number of 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 suitable for the requirements of machine-sewing.

3.5.7 Type VII. Type VII thread shall be multiple cord (ply) construction, soft finish. Each of the individual plies shall be twisted initially with not less than the number of 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 not be less than the minimum specified in table VII and shall be suitable for multi-needle quilting machines.

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, II and VII threads when used for sole stitching of footwear or coreless bobbins and top threads for quilting may be "S" or "Z" depending upon the requirements of the sewing machine.

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

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TABLE I. Type I - Twisted multiple cord, soft finish

| Letter size | ply | Final twist (t.p.i.) | Nominal Tex No. (g/km) | Length per | | Breaking force minimum | Elongation percent |
|----------------|--------|----------------------------|------------------------------|------------|--------|---------------------------|-----------------------|
| | | min. | | min. | max. | pounds | maximum |
| 00 | 2 | 12.0 | 17 | 25,801 | 31,000 | 1.8 | 26 |
| A | 3 | 10.0 | 23 | 18,001 | 25,800 | 2.8 | 26 |
| AA | 2 or 3 | 9.0 | 32 | 13,001 | 18,000 | 4.1 | 26 |
| B | 2 or 3 | 7.0 | 46 | 8,701 | 13,000 | 6.0 | 26 |
| E | 3 | 6.0 | 68 | 5,801 | 8,700 | 9.0 | 26 |
| F | 3 or 4 | 5.5 | 101 | 4,001 | 5,800 | 11.8 | 26 |
| FF | 3 | 5.0 | 144 | 2,901 | 4,000 | 17.5 | 26 |
| Number size | | | | | | | |
| 3 | 3 | 4.5 | 205 | 1,951 | 2,900 | 27.0 | 26 |
| 4 | 3 | 4.0 | 292 | 1,451 | 1,950 | 36.0 | 26 |
| 5 | 3 | 3.5 | 381 | 1,151 | 1,450 | 45.0 | 26 |
| 6 | 3 | 3.0 | 472 | 951 | 1,150 | 54.0 | 26 |
| 8 | 3 | 2.5 | 601 | 701 | 950 | 72.0 | 26 |

TABLE II. Type II - Twisted multiple cord, bonded finish

| Letter size | Ply | Final twist (t.p.i.) | Nominal Tex No. (g/km) | Length per | | Breaking force minimum | Elongation percent |
|----------------|--------|----------------------------|------------------------------|------------|--------|---------------------------|-----------------------|
| | | min. | | min. | max. | pounds | maximum |
| 00 | 2 | 12.0 | 19 | 23,201 | 29,000 | 1.8 | 26 |
| A | 3 | 10.0 | 25 | 16,201 | 23,200 | 2.8 | 26 |
| AA | 2 or 3 | 9.0 | 36 | 11,701 | 16,200 | 4.1 | 26 |
| B | 2 or 3 | 7.0 | 51 | 7,801 | 11,700 | 6.0 | 26 |
| E | 3 | 6.0 | 76 | 5,201 | 7,800 | 9.0 | 26 |
| F | 3 or 4 | 5.5 | 112 | 3,601 | 5,200 | 11.8 | 26 |
| FF | 3 | 5.0 | 160 | 2,601 | 3,600 | 17.5 | 26 |
| Number size | | | | | | | |
| 3 | 3 | 4.5 | 268 | 1,751 | 2,600 | 27.0 | 26 |
| 4 | 3 | 4.0 | 325 | 1,301 | 1,750 | 36.0 | 26 |
| 5 | 3 | 3.5 | 426 | 1,051 | 1,300 | 45.0 | 26 |
| 6 | 3 | 3.0 | 526 | 851 | 1,050 | 54.0 | 26 |
| 8 | 3 | 2.5 | 684 | 600 | 850 | 72.0 | 26 |

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TABLE III. Type III - Monocord, bonded finish

| Letter size | Ply | Nominal Tex No. (g/km) | Length per pounds (yds) | | Breaking force pounds | Elongation percent maximum |
|----------------|-----|------------------------------|----------------------------|--------|--------------------------|----------------------------------|
| | | | min. | max. | | |
| 00 | 1 | 20 | 23,901 | 27,000 | 1.8 | 35 |
| A | 1 | 25 | 16,351 | 23,900 | 2.8 | 35 |
| AA | 1 | 34 | 13,301 | 16,350 | 4.1 | 35 |
| B | 1 | 47 | 8,001 | 13,300 | 6.0 | 35 |
| E | 1 | 75 | 5,201 | 8,000 | 9.0 | 35 |
| F | 1 | 110 | 3,851 | 5,200 | 11.8 | 35 |
| Number size | | | | | | |
| 3 | 1 | 258 | 1,701 | 2,150 | 27.0 | 35 |
| 4 | 1 | 331 | 1,301 | 1,700 | 36.0 | 35 |
| 5 | 1 | 431 | 1,001 | 1,300 | 45.0 | 35 |
| 6 | 1 | 536 | 851 | 1,000 | 54.0 | 35 |
| 8 | 1 | 684 | 600 | 850 | 72.0 | 35 |

TABLE IV. Type IV - Hand-sewing twist, wax finish

| Letter size | Ply | Nominal Tex No. (g/km) | Length per pound (yds) after wax removed (see 4.2.4.1.1) thread | | Breaking force minimum pounds | Elongation percent maximum |
|----------------|-----|------------------------------|--|--------|-------------------------------------|----------------------------------|
| | | | min. | max. | | |
| A | 2 | 36 | 13,001 | 14,600 | 3.5 | 35 |
| C | 2 | 45 | 8,901 | 13,000 | 5.7 | 35 |

TABLE V. Type V - Buttonhole twist, hand-sewing, (waxed)

| Number size | Ply | Nominal Tex No. (g/km) | Length per pound (yds) after wax removed (see 4.2.4.1.1) thread | | Breaking force minimum pounds | Elongation percent maximum |
|----------------|-----|------------------------------|--|-------|-------------------------------------|----------------------------------|
| | | | min. | max. | | |
| 6 | 3 | 191 | 2,321 | 2,920 | 20.0 | 35 |
| 8 | 3 | 160 | 2,921 | 3,310 | 16.0 | 35 |
| 10 | 3 | 132 | 3,311 | 4,180 | 14.0 | 35 |

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TABLE VI. Type VI - Tailoring, twisted multiple cord, soft finish

| Letter size | Ply | Nominal Tex No. (g/km) | Length per pound (yds) | | Breaking force minimum pounds | Elongation percent maximum |
|-------------|--------|------------------------|------------------------|--------|-------------------------------|----------------------------|
| | | | min. | max. | | |
| O | 2 or 3 | 24 | 16,000 | 25,000 | 2.8 | 35 |
| B | 2 or 3 | 40 | 11,001 | 14,000 | 4.1 | 35 |
| F | 3 | 97 | 4,201 | 6,000 | 11.0 | 35 |

TABLE VII. Type VII - Quilting thread, coreless cocoon bobbins and top thread, twisted multiple cord, soft finish

| Letter size | Ply | Final twist (t.p.i.) | Nominal Tex No. (g/km) | Length per pounds (yds) | | Breaking force minimum pounds | Elongation percent maximum |
|-------------|-----|----------------------|------------------------|-------------------------|--------|-------------------------------|----------------------------|
| | | | | min. | max. | | |
| OO | 2 | 12.0 | 18 | 24,781 | 33,040 | 1.8 | 33 |
| A | 3 | 10.0 | 25 | 16,521 | 24,780 | 2.8 | 33 |
| AA | 3 | 9.0 | 35 | 12,391 | 16,520 | 4.1 | 33 |
| B | 2 | 7.0 | 50 | 8,851 | 12,390 | 6.0 | 33 |

3.7.1 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.

3.8 Finish. No chemical finishes shall be applied except those necessary to provide good sewing quality and as applicable, for bonding (types II and III), and waxing (types IV and V). Types IV and V thread shall be waxed so that the thread shall have a smooth, dressed surface suitable for hand-sewing (see 4.2.3). For class B, the thread shall be given an approved nonwicking finish (see 3.8.2).

3.8.1 Nonwicking (class B). The class B thread shall resist the wicking of water for a period of not less than 6 hours when tested as specified in 4.2.3.

3.8.2 Finish approval (class B). The class B thread shall be finished with an approved nonwicking finish uniformly applied (see 6.8). The use of compounds containing mercury in any form is prohibited.

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3.9 Put-up. Unless otherwise specified (see 6.2), the thread shall be put-up as specified in table VIII on commercial holders. Plastic tubes when used shall conform to 3.9.1. When put-up is specified on ready-made lockstitch bobbins or cacoen bobbins, the style of bobbin and the length of thread thereon shall be in accordance with the contract or purchase order and shall be by count or net weight. The average weight per holder shall be not less than the specified net weight minus 3.0 percent tolerance when tested (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 when tested as specified in 4.2.1.

TABLE VIII. Put-up

| Thread type | Letter size and number size | Type of holder | Nominal weight per holder (see 3.9) ounces |
|-------------|-------------------------------|---|--|
| I. II. III | All letter and number sizes | Single-head plastic tube | 4, 8, 16 or 32 |
| I, II, III | Number sizes 3, 4, 5, 6 and 8 | Single-head plastic tube | 8, 16 or 32 |
| IV and V | All letter sizes | Skein | 1/2 or 1 |
| VI | All letter sizes | Single-head wooden spool; or single-headed plastic tube | 1/2, 2 or 4 |
| VII | All letter sizes | (As specified see 6.2) | |

3.9.1 Plastic tubes. Except as otherwise specified or approved by the contracting officer, single-head plastic tubes shall be made of either acrylonitrile as specified in 3.9.1.1 or polypropylene as specified in 3.9.1.2.

3.9.1.1 Acrylonitrile. The tubes shall be acrylonitrile-butadiene-styrene (ABS) rigid plastic (see 6.6) meeting the requirements of type I of L-P-1183 with the following values substituted in the table of property values (see 4.2.3).

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Property values

| | |
|--|---------|
| Impact strength (Izod), min., ft. -lb per inch of notch at 23° \pm 2°C (1/8 inch sample) | 1.5 |
| Tensile yield stress, min., p.s.i. | 6,600 |
| Deflection temperature under load, min. (264 p.s.i. fiber stress): | 190°F |
| Modulus of elasticity in tension, min., p.s.i. | 390,000 |
| Rockwell hardness (R scale), min. | 105 |
| Specific gravity, 23°/23°C, max. | 1.2 |
| Chemical resistance, 40-hr. immersion in heptane at 23° \pm 2°C weight change, max., percent | 5.0 |

3.9.1.2 Polypropylene. The tubes shall be molded from a virgin propylene homopolymer plastics (see 6.7) meeting the requirements of classification I-58208 under ASTM D 2146 (see 4.2.3).

3.10 Identification marking. Except when commercial identification markings are specified in the invitation to bid, each holder shall have a label attached in such a manner as to remain in place and be clearly legible until all thread has been removed. The label shall be printed with the information as specified below:

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

For types I and II 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. The occurrence of defects shall not exceed the applicable 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 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 the document 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. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

4.2.1 End item examination.

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

TABLE IX. Thread on holder defects

| Examine | Defect |
|----------------------|---|
| Identification label | Missing, incorrect, incomplete, illegible, or insecurely attached. |
| Type of holder | Other than specified. |
| Surface condition | Loose ply, cut, tear, chafe, slip, affecting strength of thread or interfering with easy location of end and initial unwinding. |
| Cleanliness | Dirt, spot, or stain clearly noticeable. |
| Finish | Other than specified. Uneven, lumpy, bare, or thin spots. |

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

TABLE X. Thread as unwound defects

| Examine | Defect |
|-----------------------|--|
| Continuous length | Not in continuous lengths. |
| Knot | Size FF and finer thread averages more than one thread knot per 2 ounces. Size 3 and heavier thread averages more than one thread knot per 4 ounces. |
| Color | Other than specified. Uneven, apparent on successive layers or end to end. |
| Winding | Improperly or not firmly wound resulting in kinks, knots, entangling, or slippage during unwinding or otherwise affecting free unhampered unwinding of the thread. |
| Tackiness or adhesion | Strands adhere to each other or to holder affecting unwinding tension. |

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 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 item shall be tested as indicated in table XI. The methods of testing specified in FED-STD-191 wherever applicable and as listed in table XI shall be followed. The physical and chemical values specified in section 3 apply to the average of all the determinations made on a sample unit for test procedures. The lot size shall be expressed in units of one holder except for ready made bobbins which shall be expressed in units of one gross. 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.

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TABLE XI. End item tests

| Characteristic | Requirement paragraph | Test method |
|-----------------------------------|-----------------------|--------------------------|
| Nylon yarn: | | |
| Identification | 3.3.1 | 1530 <u>1/</u> |
| Melting point | 3.3.1 | 1534 <u>1/</u> |
| Bright | 3.3.1 | Visual <u>1/</u> |
| Continuous multifilament | 3.3.1 | Visual <u>1/</u> |
| Bonding agent (as applicable) | | |
| composition | 3.3.2 | <u>1/</u> |
| Shade match | 3.4.1 | 4.2.4.1 |
| Colorfastness (as applicable) to: | | |
| Laundering (after 3 cycles) | 3.4.2 | 5614 <u>2/</u> <u>3/</u> |
| Light | 3.4.2 | 5660 |
| Wet drycleaning | 3.4.2 | 5622 |
| Perspiration | 3.4.2 | 5680 |
| Weathering | 3.4.2 | 5671 |
| Construction | 3.5 | Visual |
| Direction of twist: | | |
| Initial | 3.6 | 4050 |
| Final | 3.6 | 4050 |
| Twist (t.p.i.) | | |
| Individual | 3.5 and 3.7 | 4054 <u>1/</u> <u>4/</u> |
| Final | 3.5 and 3.7 | 4054 <u>1/</u> <u>4/</u> |
| Number of plies | 3.7 | Visual <u>5/</u> |
| Length per pound | 3.7 | 4010 <u>6/</u> |
| Breaking force | 3.7 | 4100 <u>7/</u> |
| Elongation | 3.7 | 4100 <u>7/</u> |
| Finish limitations | 3.8 | <u>1/</u> |
| Wax finish (type IV and V) | 3.8 | Visual |
| Nonwicking (class B) | 3.8.1 | 4504 |
| Composition of plastic tubes | 3.9.1 | <u>1/</u> |

1/ Unless otherwise specified, a certificate of compliance shall be submitted and will be acceptable for the stated requirement.

2/ The specimens must be dried after each of the 3 laundering cycles.

3/ 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.

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- 4/ The test for 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.
- 5/ One determination per sample unit and the result reported as "pass" or "fail".
- 6/ In cases of dispute the length per pound of the thread shall be determined on the thread without finish. Procedure for the removal of finish shall be as specified in 4.3.1.1.
- 7/ Except that five determinations shall be made per sample unit.

4.2.4 Packaging inspection. Inspection shall be made in accordance with the provisions of PPP-P-50 to determine whether packaging, packing, and marking comply with the section 5 requirements.

4.3 Methods of inspection.

4.3.1 Shade match evaluation.

4.3.1.1 Removal of finish. If a sample contains finish, before evaluation for shade matching, the sample of thread shall be wet drycleaned 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, (see 6.3.1) according to the procedure of method 9010.

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 sample shall match the standard sample when viewed undered 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.

5. PREPARATION FOR DELIVERY

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

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5.1.1 Levels A, B, and C. The thread shall be packaged in accordance with the applicable requirements of PPP-P-50.

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

5.2.1 Levels A, B and C. The thread 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, shipments shall be marked in accordance with applicable provisions of PPP-P-50.

6. NOTES

6.1 Intended use. The threads are intended for use, as applicable, in items of clothing, equipage and footwear, and in air delivery and safety equipment. Class B is used primarily for leather combat boots (direct molded sole) and gloves.

6.1.1 Restriction. Only types I and II thread are normally authorized for use in parachutes and other flight safety equipment.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Type, class, and letter or number size of thread required (see 1.2.1 and 1.2.1.1).
- (c) Color (shade) required (see 3.4).
- (d) Colorfastness properties required (see 3.4.2).
- (e) Direction of twist (see 3.6).
- (f) Put-up required (see 3.9).
- (g) Selection of applicable levels of packaging and packing (see 5.1 and 5.2).
- (h) Style of bobbin and length of thread for ready made bobbins (see 3.9).

6.3 Standard sample. For military shades, the standards for shade reference are those contained in the Standard Color Card for the Official Standardized Shades of Sewing Threads 1968 (see 2.2). For other shades, address the procuring activity issuing the invitation for bids or request for proposal. Standard samples frequently used by the Military (directly or for components of end items) have been made available to normal contractors as basic reference for the establishment of the contractor's secondary standards conforming to the characteristics of the official standards. The basic shade standards are those appearing in the DOD Color Card.

6.3.1 Shade matching evaluation. In cases where it is not considered feasible to remove the finish prior to shade matching, the thread may be evaluated on an "as is" basis upon approval of the contracting officer (see 4.3.1).

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6.4 Dye formulations. The following combinations of dyes are suggested, but not mandatory, for the indicated shades:

Green - E - CA 66034

Acid Green 58

Acid Green 70

Acid Orange 86

Acid Orange 85

Black AA - CA 66043

Mordant Black 11, CI 14645

Olive Drab S-1 - CA 66022

Acid Brown 44

Acid Green 58

Acid Yellow Pr. 713

6.5 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 clothing which is drycleaned. | Good fastness to wet drycleaning, perspiration, and light. |
| Thread for sewing clothing which is laundered. | Good fastness to laundering (after 3 cycles) perspiration, and light. |
| Thread for sewing footwear. | No colorfastness tests apply. |
| Thread for sewing air delivery and safety equipment. | Good fastness to light and to laundering (after 3 cycles) or wet drycleaning, whichever is applicable. |
| Thread for sewing outside of handwear. | Good fastness to laundering (after 3 cycles) perspiration, drycleaning and light. |
| Thread for sewing inside of handwear. | No colorfastness test applicable. |
| Thread for parachute and cargo. | Good fastness to weathering. |

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6.6 Material for acrylonitrile tubes. "ABS" material known as "Kralastic MM" has been used satisfactorily to make injection-mold tubes to meet the requirements specified in 3.9.1. Kralastic MM is made by the Naugatuck Chemical Division of the U.S. Rubber Company, Naugatuck, CT.

6.7 Material for polypropylene tubes. "EL Rexene PP 11-S-5" material has been used satisfactorily to make injection molded tubes meeting the requirements specified in 3.9.1. Resin is made by Dart Industries, Inc., P.O. Box 37, West 115 Century Road, Paramus NJ 07652.

6.8 Finish. Approval of nonwicking finish for utilization under this specification is the responsibility of the U.S. Army Natick Research and Development Center, Natick, MA 01760-5014 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 3.8.2).

6.8.1 Submittal for finish approval (class 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 and Development Center, ATTN: DRXNM-VTF. It should be accompanied by two spools approximately 8 ounces after the water-repellant treatment and two spools approximately 8 ounces containing both the water-repellant 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 members, used to identify the thread shipped with the treatment and finish approved.

6.9 Formula disapproval (class B). For the information of the supplier, the use of proteins and their derivatives, starch, hydrophilic materials, oxidizing oil, oxidizing resins, and resin or compounds to increase hydroscopicity may lead to formula disapproval (see 3.8.2).

6.10 Size. In order to adopt one uniform sizing method for all types of threads, the Tex system has been selected (weight in grams of 1000 meters). The average Tex number is shown along side of the length per pound column.

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MILITARY INTERESTS:

Custodians

Army - GL
Navy - NU
Air Force - 20

Review Activities

Army - MD, MI, EA
Air Force - 11, 99
DNA - DS

DLA - CT

User Activities

Army - AR
Navy - AS, MC, CG

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS
POS
VA - DMS

Preparing Activity

Army - GL

Project No. 8310-0143

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| b. ADDRESS (Street, City, State, ZIP Code) | | | |
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| a. Paragraph Number and Wording: | | | |
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