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INCH-POUND

MIL-R-44123B
10 May 1990
SUPERSEDING
MIL-R-44123A
26 July 1988

MILITARY SPECIFICATION

ROPE, FIBROUS, DOUBLE-BRAIDED, NYLON/POLYESTER COMPOSITE

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

1. SCOPE

1.1 Scope. This specification covers one type of double-braided nylon/polyester composite rope for use in airdrop systems.

1.2 Classification. The rope shall be of the sizes shown in table III, as specified (see 6.2).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

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 01760-5014 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 4020

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SPECIFICATIONS

FEDERAL

UU-T-81 - Tags, Shipping and Stock

MILITARY

MIL-C-3131 - Cordage; Packaging of

STANDARDS

FEDERAL

FED-STD-191 - Textile Test Methods

MILITARY

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

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following document forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 4268 - Testing Fiber Ropes

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

(Non-Government standards and other publications are normally available from organizations that prepare or distribute the document. These documents also may be available in or through libraries or other informational services.)

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

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3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.3.

3.2 Government or contractor purchases. The requirements specified in 3.8, 3.9 and 3.10 apply only to rope purchased directly by the Government. All other requirements apply both to rope purchased as a component for an end item by a contractor and to rope purchased directly by the Government.

3.3 Material. It is encouraged that recycled material be used when practical as long as it meets the requirements of this specification.

3.3.1 Nylon. The core braid shall be fabricated from bright, white, high tenacity, heat and light resistant, continuous filament nylon yarn having a minimum tenacity of 7.0 grams per denier.

3.3.2 Polyester. The cover braid shall be fabricated from bright, white, high tenacity, heat and light resistant, continuous filament polyester yarn having a minimum tenacity of 6.5 grams per denier.

3.4 Construction. The rope shall be of double-braided construction wherein a braid of hollow structure manufactured in a separate operation serves as the core, while a cover is braided over it in a second operation. In the manufacture of each braid, one-half of the yarns shall have "S" twist, while "Z" twist shall be employed in the remaining yarns. Testing shall be as specified in 4.4.4.

3.4.1 Core and cover yarns. The core yarns shall be one size (denier) and all cover yarns shall be one size. The weight of the core shall be no less than 40 percent and no more than 48 percent of the total weight of the rope for any designated size. Structural requirements for the core braid shall be in accordance with table I. Structural requirements for the cover braid shall be in accordance with table II.

TABLE I. Structural requirements for core braid

Cores for use in rope sizes (circumference) Inches	Type of braid	Number of Carriers	Ends per carrier Min.	Ends per carrier Max.	Multiplier (based on picks per inch) Min.	Multiplier (based on picks per inch) Max.
3/4 to 2 incl.	Plain	8	1	6	1.5	1.9
	Twill	12	1	3	2.2	2.8
2-1/4 to 4-1/2 incl.	Plain	8	2	6	1.5	1.9
	Twill	12	2	4	2.2	2.8

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TABLE I. Structural requirements for core braid (cont'd)

Cores for use in rope sizes (circumference) Inches	Type of braid	Number of Carriers	Ends per carrier Min.	Ends per carrier Max.	Multiplier (based on picks per inch) Min.	Multiplier (based on picks per inch) Max.
5 to 21 incl.	Twill	12	2	3	2.2	2.8

TABLE II. Structural requirements for cover braid

Rope size (circumference) Inches	Type of braid	Number of carriers	Ends per carrier	Multiplier (based on picks per inch) Min.	Multiplier (based on picks per inch) Max.
3/4 to 1-1/4 incl.	Twill	16	2	5.2	6.0
1-1/2 to 2 incl.	Twill	20	2	6.0	7.0
2-1/4 to 4-1/2 incl.	Twill	24	2	7.0	8.0
5 to 21 incl.	Twill	32	2	8.7	10.0

3.4.2 Twist of yarn. All yarns in the core and cover braids shall be twisted in such a manner that after braiding, all surface filaments are essentially parallel to the longitudinal axis of the rope. Heat setting of the ropes shall not be permitted.

3.4.3 Multipliers. Multipliers specified in tables I and II overcome the complexity of listing a range of pick counts for every size. Pick count and circumference for either the inner or outer braid shall be measured at the appropriate load P (see table III) for the approximate rope size and shall be used in all calculations for the inner and outer braids as appropriate. The calculation shall be as follows:

Multiplier = Pick count times circumference

3.5 Physical requirements. The finished rope shall conform to the physical properties specified in table III when tested as specified in 4.4.4.

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TABLE III. Rope physical properties

Circumference at Load "P" (approximate) Inches	Diameter (approximate) Inches	Load "P" Pounds	Weight per 100 feet at load "P" (+ 5%) Pounds	Breaking strength (minimum) Pounds
3/4	1/4	12	2.1	2,490
1	5/16	20	3.1	3,650
1-1/8	3/8	28	4.1	4,780
1-1/4	7/16	38	5.3	6,260
1-1/2	1/2	50	7.2	8,930
1 3/4	9/16	65	9.3	11,200
2	5/8	80	11.8	13,900
2-1/4	3/4	110	16.2	19,600
2-3/4	7/8	150	22.1	26,200
3	1	200	29.4	34,300
3-1/2	1-1/8	250	36.6	42,300
3-3/4	1-1/4	310	43.8	50,200
4	1-5/16	345	54.6	62,000
4-1/2	1-1/2	450	66.5	73,500
5	1-5/8	530	71.9	85,000
5-1/2	1-3/4	610	88.6	102,000
6	2	800	107.0	121,000
6 1/2	2 1/8	900	125.0	142,000
7	2-1/4	1010	145.0	163,000
7-1/2	2-1/2	1250	167	185,000
8	2-5/8	1375	188	207,000
8-1/2	2-3/4	1510	220	240,000
9	3	1800	250	272,000
10	3-1/4	2100	307	335,000
11	3-5/8	2450	365	398,000
12	4	3200	439	460,000
13	4-1/4	3600	503	521,000
14	4-5/8	4300	588	603,000
15	5	5000	672	683,000
16	5-1/4	5500	755	763,000
17	5-1/2	6050	840	842,000
18	6	7200	923	921,000
19	6-1/4	7800	1007	1,000,000
20	6-1/2	8450	1092	1,078,000
21	7	9800	1260	1,233,000

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3.5.1 Elongation. The elongation of the rope shall not be less than 20 nor greater than 30 percent at the minimum breaking strength specified in table III when tested as specified in 4.4.4.

3.6 Finish. No extraneous material shall be added for the purpose of weighting the rope. The extractable matter of the finished rope shall not exceed 4.0 percent when tested as specified in 4.4.4.

3.7 Moisture content. The moisture content of the rope "as received" shall not exceed 5.0 percent when tested as specified in 4.4.4.

3.8 Identification marker. The manufacturer shall identify his product by inserting a kraft paper or water repellent cotton marker between the braids in all ropes larger than 1-1/8 inches circumference. Unless otherwise specified in the contract or purchase order (see 6.2), the manufacturer's name, the year of manufacture, and the type of fiber shall be clearly printed on the marker in bold, easily-read type. Italic or script type shall not be used.

3.9 Identification. In addition to the requirements of 3.8, each package unit shall have a ticket (identification) attached to it for identification purposes. The ticket shall conform to the requirements of type B, class 1, size 4 or 5, 15 CSU grade designation of UU-T-81. The ticket shall be legibly printed, stamped, or typed with water insoluble ink. The ticket shall contain the following information:

National Stock Number
Nomenclature
Specification number
Size (circumference)
Length
Weight (net)
Contract number and date
Date of manufacture (month and year)
Name of manufacturer

3.10 Put-up. Unless otherwise specified (see 6.2), the rope shall be furnished without knots or splices on nonreturnable reels no larger than 7 feet in diameter. Unless otherwise specified (see 6.2), multiple lengths shall be permitted in the same put-up. When specified (see 6.2), continuous lengths, other than a standard length, may be used. The rope shall be ordered by weight, as specified (see 6.2). Delivered weight per standard length shall be within plus 10 percent, minus 0 percent of the weight specified in table IV. The weight for lengths other than standard shall be determined in accordance with table IV with the proper length ratio applied. However, the actual length in accordance with ASTM D 4268 shall not be less than the standard length. Standard lengths are measured under slight tension in accordance with ASTM D 4268.

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TABLE IV. Put-up

Size Circumference (Inches)	Diameter (Inches)	Standard length (Feet)	Net weight per standard length (Pounds)
3/4	1/4	600	13.2
1	5/16	600	19.5
1-1/8	3/8	600	25.8
1-5/16	7/16	600	33.4
1-1/2	1/2	600	45.4
1-3/4	9/16	600	57.7
2	5/8	600	74.3
2-1/4	3/4	600	102.0
2-3/4	7/8	600	139.0
3	1	600	185.0
3-1/2	1-1/8	600	231.0
3-3/4	1-1/4	600	276.0
4	1-5/16	600	344.0
4-1/2	1-1/2	600	419.0
5	1-5/8	600	453.0
5-1/2	1-3/4	600	558.0
6	2	600	674.0
6-1/2	2-1/8	600	788.0
7	2-1/4	600	914.0
7-1/2	2-1/2	600	1052.0
8	2-5/8	600	1184.0
8-1/2	2-3/4	600	1320.0
9	3	600	1575.0
10	3-1/4	600	1934.0
11	3-5/8	600	2300.0
12	4	600	2766.0
13	4-1/4	600	3170.0
14	4-5/8	600	3704.0
15	5	600	4234.0
16	5-1/4	300	2378.0
17	5-1/2	300	2646.0
18	6	300	2907.0
19	6-1/4	300	3172.0
20	6-1/2	300	3440.0
21	7	300	3969.0

3.10.1 Braider splices. Braider splices shall be the continuation of a single interrupted strand (or multiple strand) with another identical strand which follows the identical path in the braid. Although it is desirable that no braider splices be present in the core or the cover of any size and length of rope, some methods of manufacture impose limitations. To compensate for these

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limitations, braider splices shall be in accordance with 3.10.1.1 through 3.10.1.3. When specified (see 6.2), splicing tools shall be furnished.

3.10.1.1 Standard length or less. To allow for a braider malfunction, one braider splice shall be permitted in the core and in the cover for standard length or less as specified in table IV.

3.10.1.2 Continuous lengths greater than standard lengths. To compensate for random strand failures when continuous lengths are greater than standard lengths and up to 1200 feet maximum, an additional braider splice shall be permitted in the core and in the cover. In producing the splices the distance of the overlapping shall be equivalent to eight times the circumference in inches but not less than 24 inches for ropes whose sizes are 3 inches in circumference and less.

3.10.1.3 Splice acceptance. Because splices within the core are difficult to detect subsequent to application of the cover, a certificate of compliance attesting to the number of braider splices shall be considered acceptable (see 4.4.1.1). However, a record of verifiable information shall be made available to the inspector.

3.11 Workmanship. The ends of all ropes shall be cut off squarely and be securely whipped, taped, or heat sealed. The reels shall be wound so that each turn is free from entanglement. The component braid and the finished braided rope shall conform to the quality of product established by the requirements of this specification.

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.

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

a. First article inspection (see 4.3).
b. Quality conformance inspection (see 4.4).

4.3 First article inspection. When a first article is required (see 3.1 and 6.2), it shall be examined for the defects specified in 4.4.2 and 4.4.3 and tested for the characteristics specified in 4.4.4. The presence of any defect or failure to pass any test shall be cause for rejection of the first article.

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

4.4.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4.4.1.1 Component and material certification. A certificate of compliance may be acceptable as evidence that the components listed in table V conform to the specified requirements.

TABLE V. Component and material certification

Component	Requirement	Requirement paragraph
Nylon yarn	Material identification	3.3.1
Polyester yarn	Material identification	3.3.2
Braided cover and core	Construction	3.4, 3.4.1, and 3.4.2
	Multipliers	3.4.3
Braided core	Limitation on braider splices	3.10.1.1, 3.10.1.2, 3.10.1.3

4.4.2 End item visual examination. The end items shall be examined for the defects listed in table VI. All defects found shall be counted regardless of their proximity to each other. Ten percent of the length contained on each sample unit, but not less than 100 feet, shall be subjected to the visual examination. The lot size shall be expressed in units of reels of rope. The sample unit shall be one reel of rope. The inspection level shall be I, 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 VI. End item visual defects

Examine	Defect	Classification Major	Minor
Appearance and workmanship	Any cut	101	
	Chafed or damaged	102	
	Kink, darting yarn 1/, broken or loose end, bulged strand, strand knot, or strand or yarn splice.	103	
	Ends not cut off squarely		201
	Ends not securely whipped, taped, or heat sealed		202
Identification	Omitted, incorrect, or illegible		203
	Insecurely attached or not as specified		204
	Marker missing		205
Cleanness	Spot or stain, clearly noticeable 2/		206

1/ Darting yarn is an internal yarn which projects through the surface of the strand.

2/ At normal inspection distance (approximately 3 feet).

4.4.3 Length and winding examination. The end items shall be examined for the length and winding defects listed in table VII. The lot size shall be expressed in units of reels of rope. The sample unit shall be one reel. The inspection level shall be S-3, and the AQL, expressed in terms of defects per hundred units, shall be 4.0.

TABLE VII. Length and winding defects

Defect	Defect
Length	Less than specified.
	More than the specified plus tolerance of 10 percent.
Winding	Improperly or not firmly wound resulting in kinks, knots, entangling or slippage during unwinding.
	Knots or otherwise joining of ends to make a continuous length.
	Ends not cut-off squarely and securely whipped, taped, or heat sealed.

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4.4.4 End item testing. The end items shall be tested for the characteristics listed in table IX. The methods of testing specified in FED-STD-191, wherever applicable, and as listed in table IX, shall be followed. The lot size shall be expressed in units of reels of rope. The sample size shall be in accordance with table VIII. The sample unit shall be 70 feet for all circumference ropes. The physical and chemical values specified in section 3 apply to the average of the determinations made on a sample unit for test purposes as specified in the applicable test method. All test reports shall contain the individual values utilized in expressing the final result. The lot shall be unacceptable if one or more sample units fail to meet any requirement. Tests to determine compliance with specification requirements, including quantity of delivery, may be made under prevailing atmospheric conditions. In case of dispute, testing shall be performed on sample units which have reached equilibrium under standard atmospheric conditions as defined in section 4 of FED-STD-191.

TABLE VIII. Sampling for tests

Lot size in reels	Sample size in reels
1 to 2	1
3 to 15	2
16 to 40	3
41 to 110	5
111 to 300	7
301 to 500	10
501 and over	15

TABLE IX. End item tests

Characteristic	Requirement paragraph	Test method
Number of braids	3.4	Visual 1/
Lay of rope	3.4	Visual 1/
Circumference	3.5	6003
Breaking strength	3.5	6015 2/
Elongation	3.5.1	6015 2/
Extractable matter	3.6	2611 3/
Moisture content	3.7	2600

1/ One determination per sample unit shall be made and the results shall be reported as pass or fail.

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2/ Method 6016 may be used to determine breaking force and elongation for ropes 3 inches in circumference or less.

3/ Except that extractable matter shall be determined using the chloroform extraction procedures.

4.4.5 Packaging inspection. The sampling and inspection of the preservation, packaging, and container marking shall be in accordance with the requirements of MIL-C-3131, except that the inspection level shall be S-2, and the AQL, expressed in terms of defects per hundred units, shall be 2.5.

5. PACKAGING

5.1 Preservation, packing, and marking. Preservation, packing, and marking for each level of protection shall be in accordance with the applicable requirements of MIL-C-3131 (see 6.2).

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 rope is intended for aerial delivery of heavy equipment.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of this specification.
b. Size circumference required (see 1.2 and table III).
c. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
d. When a first article is required (see 3.1, 4.3, and 6.4).
e. When information on identification marker is other than specified (see 3.8).
f. When reels are to be other than specified (see 3.10).
g. When multiple lengths are not allowed (see 3.10).
h. When continuous lengths, other than a standard length, may be used (see 3.10).
i. Weight per standard length required (see 3.10).
j. When splicing tools are required (see 3.10.1).
k. Levels of preservation and packing (see 5.1).
l. That purchaser will accept at original weight, any unit which has been shortened or cut for test specimens, if in complete compliance with this specification.

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6.3 Adjustment for high moisture content. Material furnished containing an excess of moisture will be accepted by an adjustment in weight to the 5 percent moisture basis.

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

6.5 Subject term (key word) listing.

Aerial delivery
42 K airdrop system
60 K airdrop system

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

Custodians:

Army - GL
Air Force - 99

Review activities:

Navy - AS
Air Force - 82
DLA - IS

User activity:

Navy - SH

Preparing activity:

Army - GL

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	MIL-R-44123B	90/05/10

3. DOCUMENT TITLE
ROPE, FIBROUS, DOUBLE-BRAIDED, NYLON/POLYESTER COMPOSITE

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) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

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