



RAKSHA MANTRALAYA
MINISTRY OF DEFENCE

JOINT SERVICES SPECIFICATION

ON

CORDS NYLON - VARIOUS
(DS Cat No, 4020-000 112, 000 144 to 000 116)

JSS: 4020-09: 1999
(Revision No. 1)

MANAKIKARAN NIDESHALAYA
RAKSHA UTPADAN TATHA POORTI VIBHAG
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NEW DELHI - 110 011

DIRECTORATE OF STANDARDISATION
DEPARTMENT OF DEFENCE PRODUCTION & SUPPLIES
MINISTRY OF DEFENCE, 'H'- BLOCK, DHQ PO
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**LIST OF MEMBERS ASSOCIATED WITH FORMULATION OF THIS
STANDARD**

1. The revision of Joint Services Specification has been approved by Air Commd P.V. karapurkar, Chairman, Stores Standardisation Sub Committee by circulation.
2. The following members have been associated in approving the draft: -

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4.	Lt Col A.S. Bajwa, Deputy Controller	CQA (T&C)
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14.	Sh V.P.S. Chawla, NSO Deputy Director	NHQ/DCV
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18.	Sh B.S.Narula, Sc 'C' Secretary	SSSC

RECORD OF AMENDMENTS

Amendment		Amendment pertains to SI. No./ Para No./ Column No.	Authority	<u>Amended by</u> Name & Appointment (IN BLOCK LETTERS)	Signature & Date
No.	Date				

CONTENTS

S.No.		<u>Page No.</u>
0.	<u>FOREWORD</u>	1
1.	<u>SCOPE</u>	2
2.	<u>RELATED SPECIFICATIONS</u>	2
3.	<u>STANDARD PATTERN</u>	3
4.	<u>MATERIAL</u>	3
5.	<u>MANUFACTURE</u>	3
6.	<u>DIMENSIONS AND OTHER DETAILS</u>	3
7.	<u>WORKMANSHIP AND FINISH</u>	4
8.	<u>MARKING</u>	4
9.	<u>QUALITY ASSURANCE</u>	4
10.	<u>PRE – INSPECTION OF STORES / CONSIGMENT</u>	4
11.	<u>SAMPLING</u>	5
12.	<u>CRITERIA FOR CONFORMITY</u>	6
13.	<u>WARRANTY</u>	6
14.	<u>PACKAGING</u>	6
15.	<u>DEFENCE STORES CATALOGUE NUMBERS</u>	8
16.	<u>SUGGESTIONS FOR IMPROVEMENT</u>	8
	<u>APPENDIX ‘A’ TO ‘D’</u>	9-13

0. FOREWORD

0.1 This Specification has been prepared by the Stores Standardisation Sub Committee on the authority of the Standardisation Committee, Ministry of Defence.

0.2 This specification has been approved by the Ministry of Defence and is mandatory for use by the Defence Services.

0.3 This specification is a revision of JSS 4020-09 of Mar 1984 (Reaffirmed 1993) and supersedes the same.

0.4 This specification would be used to guide design, manufacture, quality assurance and procurement of the items.

0.5 Quality Assurance Authority for the item covered by this specification are CQA (T&C), Kanpur; and JDQAS (Aero), New Delhi for Army, Air Force respectively. Enquiries regarding this specification, relating to any contractual conditions, shall be addressed to the Quality Assurance Authority named in the tender or contract. Other enquiries shall be referred to: -

The Director,
Directorate of Standardisation,
Ministry of Defence,
'H' Block, DHQ PO,
New Delhi-110011

0.6 Copies of this specification can be obtained on payment from: -

The Controller
Controllerate of Quality Assurance
(Textiles & Clothing).
Post Box No. 294,
Kanpur – 208001.

0.7 This specification holds good only for the supply order for which it is issued.

JSS: 4020-09: 1999
(Revision No. 1)

1. SCOPE

1.1 This specification covers the requirements and methods of test for four varieties of Cords Nylon, Braided, White. These are continuous filament nylon cords of braided construction and are used as rigging lines / breaking cords in supply dropping parachutes.

2. RELATED SPECIFICATIONS

2.1 Reference is made in this specification to: -

IS 1390: 1983	Methods for determination of pH value of aqueous extracts of textile materials (first revision) Reaffirmed 1993.
IS 1912: 1984	Country jute twine (second revision) (Amendment 1) Reaffirmed 1995
IS 2508: 1984	Low density polyethylene films
IS 2771 (Part 1): 1990	Fibreboard boxes: part 1 Corrugated fibreboard boxes (Second revision) (Amendment 1)
IS 4227: 1981	Cord, nylon, braided, for aerospace applications (first revision)
IS 4437: 1973	Braided nylon cords for personnel parachutes (first revision)
IS 4905: 1968	Methods for random sampling (Amendment 1) Reaffirmed 1991
IS 10106 (Part 3/Sec 1): 1984	Packing code: Part 3 Ancillary materials, Sec 1 Cushioning materials Reaffirmed 1994
IS 12734: 1989	Polypropylene twine
IS 8135 – 10: 1996	Polypropylene strapping, 12 mm wide

2.2 Copies of the Indian Standards are obtainable on payment from: -

Bureau of Indian Standards,
Manak Bhavan,
9, Bahadur Shah Zafar Marg,
New Delhi – 110002.
Or
Their regional / branch offices

2.3 Copies of JSS 8135 – 10 are obtainable on payment from: -

The Controller,
Controllerate of Quality Assurance
(Textiles & Clothing),
Post Box No. 294,
Kanpur – 208 001,

3. STANDARD PATTERN

3.1 The standard pattern of Cord, Nylon held in the custody of the Controller, Controllerate of Quality Assurance (Textile & Clothing), post Box No. 294, Kanpur – 208 001 shall constitute the standards as regards any particulars or properties not noted or defined in this specification.

4. MATERIAL

4.1 The nylon yarn used in the manufacture of cords shall be bright and high tenacity type 66 or 6 as described in clause 2.1.1 of IS 4277. The counts of Yarn shall be as per Appendix 'A'.

5. MANUFACTURE

5.1 The Yarn shall first be suitably twisted and double to the requirement given in the table under Appendix 'A'. During the process of throwing, tension applied shall not be unduly high. The braiding machine shall be so adjusted that it gives a firm and tight braiding without putting any extra tension on the yarn.

6. DIMENSIONS AND TOLERANCES

6.1 The Cord described in this specification shall conform to the essential particulars given in Appendix 'A'.

JSS: 4020-09: 1999

(Revision No. 1)

7. WORKMANSHIP AND FINISH

7.1 The cords shall be free from all manufacturing flaws. The core and braiding ends shall be free from knots, slubs and stains. The finished cords shall be free from Slackness of sheath and tendency for core threads to penetrate the sheath when tested in accordance with the method described in Appendix 'D' to IS 4227.

8. MARKING

8.1 Each hank/ball shall be tied with a cardboard label or size 45x25 mm on which manufacturers, Initials or recognized trademark, year of manufacture, length of the hank/ ball, nomenclature and the DS Cat Number of the store shall be marked.

9. QUALITY ASSURANCE

9.1 Examination of the samples taken from any portion of a consignment shall show that the cords conform to the following requirements when tested as per method mentioned against each: -

Test	Requirements	Method (Refer to)
(a) Final liner density of sheath and core	Appendix 'A' (Col. 5& 8)	Appendix 'D'
(b) Plastic per dm in the sheath	Appendix 'A' (Col. 6)	Appendix 'B'
(c) Mass in 'g' per 100m, Max	Appendix 'A' (Col.9)	Appendix 'C'
(d) * breaking load (15 cm between the grips), N,Min	Appendix 'A' (Col. 10)	Appendix 'C' of IS 4227
(e) Elongation at break, percent, Min	Appendix 'A' (Col. 11)	Appendix 'C' of IS 4437
(f) ph value of aqueous extract	6.0 to 8.5	IS 1390 (Cold method)

* Note: No individual Breaking load reading should be less than the specified.

10. PRE – INSPECTION OF STORES / CONSIGNMENT

10.1 Manufacturers / contractors must satisfy themselves that the stores are in accordance with the terms of the contract and fully conform to he required specification,

by Carrying out a through pre – inspection of each lot before actually tendering the same for inspection to the Quality Assurance Officer nominated under the terms of the contract. A declaration by the contractor that a necessary pre – inspection has been carried out on the stores tendered, will be submitted alongwith the challan. The declaration will also indicate the methods followed in carrying out pre – inspection showing the features checked / tested and will have the test certificate attached to the challan / declaration.

10.2 If the Quality Assurance Officer finds that pre – inspection of the consignment as required above has not been carried out, the consignment is liable for rejection.

11. SAMPLING

11.1 The manufacture / supplier shall offer the stores serially numbered and arranged in such a way that the entire lot is accessible to the Quality Assurance Officer.

11.2 The Quality Assurance Officer shall draw samples from the bulk lot at random using the technique of simple random sampling as given in IS 4905.

11.3 For evaluating yarn, turns per metre, number of ends in core and sheath, number of spindles and number of plights per dm, the rolls selected as in Column 2 of the Table given below shall constitute the test sample. Number of rolls found defective should not exceed the corresponding number given in Column 3 of the Table. In case of length, the value obtained for each roll shall be compared with its specified / declared or marked length. The mean percentage of deficiency in length, if any, shall be determined as made applicable to the lot.

11.4 For evaluating other laboratory tests, the number of rolls specified in column 4 of the Table shall constitute the test sample.

11.5 The length of the sample for subjecting to full tests shall be 5 metres. A three-metre sample shall also be drawn from the remaining lot for breaking load test only.

TABLE

Lot Size	Sample Size for visual examination (No. of rolls to be selected)	Permissible No. of defective rolls	Sub – sample Size (No. of rolls to be selected for laboratory tests)
1	2	3	4
Up to 25	5*	0	3
26 to 50	8	0	5

JSS: 4020-09: 1999
(Revision No. 1)

51 to 100	13	1	7
101 to 150	20	2	9
151 to 300	32	3	11
301 to 500	50	5	13
501 to 1000	80	7	15

* or lot size when less than 5.

12. CRITERIA FOR CONFORMITY

12.1 All the sample units drawn shall be tested / examined to the relevant specification requirements. If all the sample units are found to conform to the requirements of this specification, the supply would be considered to be in conformity otherwise not.

13. WARRANTY

13.1 The stores supplied against the order shall be deemed to bear a warranty of the contractor against defective material, workmanship and performance of a period of twelve months from the date of receipt of stores at consignee's depot. If during this period the stores supplied are found by the consignee to be so defective, the same shall be replaced immediately with serviceable store by the contractor at site free of any charges or cost.

14. PACKAGING

14.1 The following materials shall be used for the packing of capes: -

	<u>Material</u>	<u>Conforming to</u>
(a)	Low density polyethylene film, 0.04mm thick	IS 2508
(b)	Twine, jute, 3 ply Or Polypropylene twine	IS 1912 IS 12734
(c)	Triple walled corrugated fibreboard boxes (puter liners shall be laminated with polyethylene to provide water proofness)	IS 2771 (Part 1)

(d)	Polypropylene strapping 12 mm wide	JSS 8135 -10
(e)	Cushioning material	IS 10106 (Part 3/ Sec 1)

14.2 The cord shall be supplied in continuous hank/ ball given as under: -

Cord 400 N	-	Length shall be 750 m
Cord 14785 N	-	Length shall be 337m
Cord 3120 N	-	Length shall be 1006m
Cord 5335N	-	Length shall be 914m

14.3 Method

14.3.1 The appropriate number of rolls shall be arranged in cylindrical bundles and Secured by 3 ply jute twine / polypropylene twine to form a unit pack. Suitable number of such shall be arranged and wrapped with polyethylene film. It shall then be placed in a triple walled corrugated fiberboard box provided with water – proof arrangement.

14.3.2 Empty spaces, if any, shall be filled with suitable Cushioning material to prevent any movement of the contents inside the box. The boxes shall then be strapped by polypropylene strapping at two each end of the box and round the body of the box.

14.3.3 The gross mass of the package shall not exceed 40 kg.

14.3.4 If the store is intended for factory use, the mass of the packages shall not exceed 250 kg.

14.3 Marking

14.3.1 Before dispatch, each box shall be legibly marked by stencil, showing the following details: -

- (a) DS Cat No. and nomenclature of the store.
- (b) Quantity packed in the box.
- (c) Lot and Serial number of the box
- (d) Month and year of packing
- (e) Gross mass of the box in kg
- (f) Name and address of the consignee
- (g) Name and address of the consignor

JSS: 4020-09: 1999

(Revision No. 1)

- (h) Name / Trade mark of the Supplier / manufacturer
- (j) Inspection Note number and date
- (k) AT / SO No. and date

15. DEFENCE STORES CATALOGUE NUMBER

15.1 The cord nylon covered by this specification shall bear the following DS Cat numbers :-

DS Cat No.	Nomenclature
4020 – 000 112	CORD NYLON, 440 N
4020 – 000 114	CORD NYLON, 17858 N
4020 – 000 115	CORD NYLON, 3120 N
4020 – 000 116	CORD NYLON, 5335 N

16. SUGGESTIONS FOR IMPROVEMENT

16.1 Any suggestion for improvement of this document may be forwarded to: -

The Director,
Directorate of Standardisation,
Ministry of Defence,
'H' Block, DHQ PO,
New Delhi – 110011

APPENDIX A

Variety No.	TYPE	No. of spindles	No of ends	Linear Density Of yarn	Plaits Per dm	No. of ends	Linear Density Of yarn	Mass per 100m,in 6 Max	Breaking Load in N(15 on bet, grips Min)	Elongation at break (%)
1	2	3	4	5	6	7	8	9	10	11
1	Cord Nylon 440 N	16	32	25 tex	70 ± 8	2	23 tsex/3/3	140	440N	25
2	Cord Nylon 1785 N	16	16	23 tex/3/3	47 ± 4	4	23 tsex/3/3	555	1785N	25
Or	-do-	16	16	70 tex/3	47 ± 4	4	70 tex/3	555	1785 N	25
Or	-do-	16	16	12 ends of 93 tex/2 and 4 ends of 93 tex/3	47 ± 4	3	93 tex/3	555	1785 N	25
3	Cord Nylon 3120N	16	32	23 tex/3/3	43 ± 4	4	23 tex/6/3	1110	3120 N	25
Or	-do-	16	32	70 tex/3	43 ± 4	4	70 tex/2/3 2 ends of	1110	3120 N	25
Or	-do-	16	16	93 tex/5	43 ± 4	3	93 tex/3 & one ends of 93 tex/4	1110	3120N	25

JSS: 4020-09: 1999
(Revision No. 1)

4	Cord Nylon 5335 N	16	48	25 tex/3/3	27 ± 4	6	25 tex/6/3	1665	5335 N	25
Or	-do-	16	48	70 tex/3 32 ends of	27 ± 4	6	70 tex/3	1665	5335N	25
Or	-do-	16	48	93 tex/3 and 16 ends of 93 tex/2	27 ± 4	4	93 tex/3	1665	5335N	25

- Note :
- (1) Turns per metre in the individual varn should be as given in clause 2.1.3 of IS 4227 for Cords of 23 tex varn. For cords made from 70 text and 95 tex varns the turns per metre should be 160 + 40.
 - (2) Where the cords are intended for use as breaking cords, the breaking load should not exceed 20 % of the minimum specified for cord breaking nylon 440 N only and 10 per cent of the minimum specified in the case of cord breaking nylon 1785 N 3120 N and 5335 N
 - (3) For variety 2,3 and 4, other counts in sheath and core ends can be used provided it is within the specified resultant count.

APPENDIX B

B. METHOD FOR DETERMINATION OF PLATES PER DECIMETRE

B.1 Prior to test, the test specimens shall be conditioned in a standard atmosphere at 65 ± 2 per cent relative humidity and $27 \text{ C} \pm 2 \text{ degC}$ temperature for at least 24 hours. Take a test specimen and apply a tension equal to one per cent of the minimum breaking load of the cord. After 60 ± 5 seconds, count the number of plights in decimeter under the load and calculate the average plights per decimeter.

C. METHOD FOR DETERMINATION OF MASS PER 100 METRE

C.1 Prior to test, the test specimens shall be conditioned in a standard atmosphere at 65 + 2 per cent relative humidity and 27 C + 2 degC temperature for at least 24 hours. Take a test specimen and apply a tension equal to one per cent of the minimum breaking load of the cord. After 60 + 5 seconds, place two marks on the cord at a distance of 3 metres apart under the load and cut the test specimen at the marks and determine its mass to the nearest one gram. Calculate the mass of the cord per 100 metre.

$$\text{Mass of cord per 100 metre, in 'g' = } \frac{M}{3} \times 100$$

Where

M = Mass of cord for 3 metre

APPENDIX D

**D. METHOD FOR DETERMINATION OF COUNT AND FOLD OF YARN
ATMOSPHERIC CONDITIONS FOR TESTING**

D.1 Prior to test, the test specimens shall be conditioned in a standard atmosphere at 65 ± 2 per cent relative humidity and 27 C ± 2 deg C temperature for at least 6 hours.

D.2 Apparatus

D.2.1 Twist Tester or any other clamping device.

D.3 Procedure

D.3.1 Remove at least 10 threads of suitable length from the cord nylon. Fasten the threads at one end of the clamping device and draw the yarn through the other clamp fixed at a distance of 250 mm apart, ensuring that the yarns are parallel. Apply slight tension by hand to remove the crimp and fix the other end also. Cut the threads with a sharp razor blade. Determine the mass in milligrams and calculate the universal count of yarn by the following formula:

$$\text{Count of yarn in tex} = \frac{M}{L} \times 100$$

Where

M = Total mass in milligrams of the yarn

L = Total length in millimeters of the yarn

Note: To ascertain the fold of yarn, untwist the yarn by hand or on twist tester.