



**GOVERNMENT OF INDIA
MINISTRY OF DEFENCE**

JOINT SERVICES SPECIFICATION

CORDS NYLON - VARIOUS

(DS Cat No, 4020 - 000 112, 000 114 to 000 116)

**JSS 4020 - 09: 2013
(Revision No. 3)**

**DIRECTORATE OF STANDARDISATION
DEPARTMENT OF DEFENCE PRODUCTION
MINISTRY OF DEFENCE, 'H' - BLOCK,
NIRMAN BHAWAN PO
NEW DELHI - 110 011**

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LIST OF MEMBERS ASSOCIATED WITH FORMULATION OF THIS STANDARD

1. The revision of this Joint Services Specification has been approved by Shri U V Dasgupta Addl, DGQA (S), Chairman, Stores Standardisation Sub Committee by circulation.

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RECORD OF AMENDMENTS

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

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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 : 2007 (Revision No. 2) 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 DQAS (Aero), New Delhi for Army and 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, Nirman Bhavan PO,
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0.6 Non - registered users can obtain on payment : -

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New Delhi - 110 011

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

0.9 **Directorate of Standardisation Website.** All the approved JSS / JSGs are available on the Directorate of Standardisation Website www.defstand.gov.in Defence organisations desirous of accessing a copy of this document are requested to approach the Directorate of Standardisation for obtaining user id / password to access the website.

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 :-

(a)	IS 1390 : 1983 (First Revision) Reaffirmed - 2004	Methods for determination of pH value of aqueous extracts of textile materials
(b)	IS 1912 : 1984 (Second Revision) Reffirmed - 1996 Amd - 1	Specification for Country Jute Twine
(c)	IS 2508 : 1984 (Second Revision) Reaffirmed - 2008 Amd - 3	Specification for Low Density polyethylene Films
(d)	IS 2771 : Part 1 : 1990 (Second Revision) Reaffirmed - 2008 Amd - 3	Corrugated Fibreboard Boxes – Specification : Part 1 : General Requirements
(e)	IS 4227 : 1998 (Second Revision) Reaffirmed - 2008	Textiles – Braided nylon cords for aerospace purposes - Specification
(f)	IS 4905 : 1968 Reaffirmed - 2006 Amd - 1	Methods for random sampling
(g)	IS 10106 : Part 3 / Sec 1 : 1984 Reaffirmed - 2009	Packaging code : Part 3 : Ancillary materials : Section 1 : Cushioning materials

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(h)	IS 12734 : 2002 (First Revision) Reaffirmed - 2007 Amd - 1	Textiles - Polypropylene Twine - Specification
(j)	JSS 8135 - 10 : 2004 (Revision No. 1) Reaffirmed - 2011 Amd - 1	Polypropylene Strapping, 12 mm Wide

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 - 208 004 (U.P.) 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 4227. 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'.

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 of size 45 x 25 mm on which manufacturers, name 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: -

Sl. No.	Test	Requirements	Method (Refer to)
(a)	Final linear density of sheath and core	Appendix 'A' (Col. 5 & 8)	Appendix 'D'
(b)	Plaits 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 : 1998
(e)	Elongation at break, percent, (Min)	Appendix 'A' (Col. 11)	Appendix 'C' of IS 4227 : 1998
(f)	pH value of aqueous extract	6.0 to 8.5	IS 1390 : 1983 (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 the 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 plaits 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

Sl. No.	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)	(5)
(a)	Up to 25	5*	0	3
(b)	26 to 50	8	0	5
(c)	51 to 100	13	1	7
(d)	101 to 150	20	2	9
(e)	151 to 300	32	3	11
(f)	301 to 500	50	5	13
(g)	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 Except as otherwise provided in the invitation to the tender, the contractor / seller hereby declares that the goods / stores, articles sold / supplied to the purchase under this contract shall be of the best quality and workmanship and new in all respect and shall be strictly in accordance with the specification and particulars contained / mentioned in the contract. The contractor / seller hereby guarantees that the said goods / stores articles would continue to conform to the description and quality aforesaid for a period of 12 months from the date of delivery of the said goods / stores / articles to the purchaser or 15 months from the date of shipment / dispatch from the contractor work, whichever is earlier and not withstanding the facts that the purchaser (QAO) may have inspected and / or approved the said goods / stores / articles. If during the aforesaid for a period of 12 / 15 months the said goods / stores / articles be discovered not to be conform to the description and quality aforesaid or not giving satisfactory performance or have deteriorated and the decision of the purchaser in that behalf shall be final and binding on the contractor / seller to rectify / replace by acceptable goods / stores / articles, or such portion or portions thereof as is found to be defective by the purchaser within a reasonable period not exceeding 3 months or as may be allowed by the purchaser in his discretion on the application made thereof by the contractor / seller and in such an event the above mentioned warranty period shall supply to goods / stores / articles rectified / replaced from the date of rectification / replacement thereof, otherwise the contractor / seller shall pay to the purchaser such compensations as determined by the purchaser as may arise by reason of the breach of the warrantee therein contained.

14. PACKAGING

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

Sl. No.	Material	Conforming to
(a)	Low density polyethylene film, 0.04mm thick	IS 2508 : 1984
(b)	Twine, jute, 3 ply or Polypropylene twine	IS 1912 : 1984 IS 12734 : 2002
(c)	Triple walled corrugated fibreboard boxes (outer liners shall be laminated with polyethylene to provide water proofness)	IS 2771 : Part - 1 : 1990

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(d)	Polypropylene strapping 12 mm wide	JSS 8135 - 10 : 2004 (Revision No. 1) Reaffirmed - 2011 Amd - 1
(e)	Cushioning material	IS 10106 : Part - 3 / Sec - 1 : 1984

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

Cord 440 N	-	Length shall be 750 m
Cord 1785 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 packs 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 places. The strapping shall be at one sixth distance from 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.
- (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 :-

<u>DS Cat No.</u>	<u>Nomenclature</u>
4020 - 000 112	CORD NYLON, 440 N
4020 - 000 114	CORD NYLON, 1785 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, Nirman Bhavan 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 g Max	Breaking Load in N(15 cm bet, grips Min)	Elongation at break (%) Min
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	440 N	25
2	Cord Nylon 1785 N	16	16	23 tex / 3 / 3	47 ± 4	4	23 tsex / 3 / 3	555	1785 N	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 3120 N	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 (93 tex / 3 & (one ends of (93 tex / 4	1110	3120 N	25
or	- do -	16	16	93 tex / 5	43 ± 4	3	(93 tex / 3	1110	3120 N	25
4	Cord Nylon 5335 N	16	48	23 tex / 3 / 3	27 ± 4	6	25 tex / 6 / 3 (93 tex / 4	1665	5335 N	25
or	- do -	16	48	70 tex / 3	27 ± 4	6	70 tex / 3	1665	5335 N	25
or	- do -	16	48	(32 ends of (93 tex / 3 & (16 ends of (93 tex / 2	27 ± 4	4	93 tex / 3	1665	5335 N	25

APPENDIX 'B'

B. METHOD FOR DETERMINATION OF PLAITS 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 $27^{\circ} \text{C} \pm 2^{\circ} \text{C}$ 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 plaits in decimeter under the load and calculate the average plaits per decimeter.

APPENDIX 'C'

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 $27^{\circ} \text{C} \pm 2^{\circ} \text{C}$ 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.

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 $27^{\circ} \text{C} \pm 2^{\circ} \text{C}$ 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 Retrieve 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:

$$\text{Count of yarn in tex} = \frac{M}{L} \times 1000$$

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.