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	Specn No. ADRDE/SPECN/100(b)	Revision no: 2 Dated: 04/07/2017
Prepared By: P K Mallik, Scientist 'D', TG(TE)	Reviewed By: Gaurav Singh Scientist 'E', TG(TE)	Issue: 02 Dated: 04/07/2017

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Government of India
Ministry of Defence

Specification
For

Cordage Nylon, Braided, Cored, 1785 N

Approved by



Group Director

Technology Group (Textile Engineering)




Aerial Delivery Research and Development Establishment

Ministry of Defence

Post Box No. 51


Station Road

Agra Cantt - 282 001

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RECORD OF AMENDMENTS

Amendment No.	Sub heading to which amendment pertains	Authority	Incorporated by Name & Rank in Block letters	Initials
1	<u>Appendix 'A' of Para 7.0 'Dimensions and Other Details'</u> Mass, max has been revised from 500 g/100m to 510 g/100m	Director ADRDE	GD, TG(TE)	

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1.0 **FOREWORD**

1.1 This specification has been prepared by a special committee and approved by Group Director, Technology Group (Textile Engineering), ADRDE, Agra.

1.2 This specification would be used for manufacture, inspection and procurement of Cordage Nylon, Braided, Cored, 1785 N against Defence requirements.

1.3 In case of any discrepancy between this specification and any sample or pattern, this specification shall be taken as correct.


1.4 Enquiries regarding this specification in relation to any contractual conditions should be addressed to the Inspection Authority named in tender or contract. Other enquiries will be referred to the issuing authority, Director, ADRDE, Agra.

1.5 Whenever a reference to any other specification occurs in this specification, it shall be taken as a reference to the latest version of that specification.

1.6 Copies of this specification can be obtained on payment from:

- i. The Director,
A.D.R. & D.E., P.B. No. 51, Station Road,
Agra Cantt. - 282 001
- ii. Concerned Inspectors and Inspection Authority.

1.7 IS specifications quoted in this specification may be obtained directly from B.I.S., Manak Bhawan, 9, Bahadur Shah Zafar Marg, New Delhi - 110 002 or its offices located in the country.

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2.0

SCOPE

2.1

This specification covers the requirement of Cordage Nylon, Braided, Cored, 1785 N used in the manufacture of parachutes and other miscellaneous Aerial Delivery Equipments.


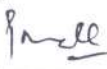
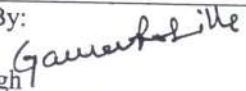
3.0

RELATED SPECIFICATIONS

3.1

Reference is made in this specification to:

- i. IS: 2 Rules for rounding off numerical values
- ii. IS: 6359 Methods for conditioning of textiles
- iii. IS: 1954 Methods for determination of length and width of fabrics
- iv. IS: 4910,P-I Methods of test for tyre cords and tyre cord fabrics made from man-made fibre – Linear density.
- v. IS: 4727 Method for determination of weight per meter (Appendix 'A')
- vi. IS: 1969 Methods for determination of breaking load and elongation at break of woven textile fabrics.
- vii. IS: 4227 Braided Nylon cords for personnel parachute.
Appendix 'B' Method for determination of sheath slackness and core looping tendency.
Appendix 'D' Method for determination of plaits/dm
- viii. IS: 3442 Method for determination of crimp and count of yarn removed from fabric.
- ix. IS: 832 Method for determination of twist in yarn
- x. IS:1390 Method for determination of pH value of aqueous extracts of Textiles (cold method).
- xi. IS: 7151 Specification for corrugated fibre board boxes for para dropping of supplies.

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- xii. IS: 4905 Methods for random sampling
- xiii. IS: 9738 Polythene bags.
- xiv. IS: 5762 Method for determination of melting temperature/range

3.2 All specifications referred to in this specification for any tender or contract, shall mean the current edition on the date of such tender or contract.

3.3 Indian Standard specifications are issued by the Bureau of Indian Standard and are obtainable on payment from Sales Section, Bureau of Indian Standard (BIS), Manak Bhawan, 9, Bahadur Shah Zafar Marg, New Delhi - 110 002 or their regional offices.

4.0 REFERENCE STANDARD


4.1 The standard of the cordage, held by ADRDE, Agra Cantt, shall constitute the reference standard as regards any particulars of properties not noted/defined in this specification.

5.0 MATERIAL

5.1 The basic material shall be bright, high tenacity, multifilament Nylon 6 or 66 yarns. One spool of about 200 meters of the basic yarn material along with its test results should be supplied by the firm for testing/approval before starting the production of advance sample (Ref. Clause 6)

6.0 MANUFACTURE

6.1 The yarn shall first be suitably twisted to the requirement, given in clause 7 below, under uniform tension. The braiding machine shall be so adjusted that it gives a firm and tight braiding without putting any non-uniform and

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undue tension on the yarn. A piece of ten metre sample along with the test results shall be forwarded as an advance sample for approval.

7.0 **DIMENSIONS AND OTHER DETAILS**

7.1 The cordage shall conform to the essential particulars given in the table under Appendix 'A'.

7.2 The cordage shall not be more than one year old from the date of manufacture to the date of delivery. A certificate to this effect shall be provided by the manufacturer/contractor at the time of delivery.

8.0 **WORKMANSHIP AND FINISH**


8.1 The cord shall be free from manufacturing flaws. The braiding ends shall be free from knots, slubs and stains. The finished cord shall be free from slackness of sheath, when tested in accordance with the method described in Appendix "D" of IS 4227.

8.2 The cord shall be smooth to handle. It shall be free from all manufacturing flaws. For details classification of defects, Appendix 'B' of this specification may be referred.

9.0 **REQUIREMENTS**

9.1 The cordage shall conform to the particulars given in Appendix 'A', when tested in accordance with the methods mentioned in related specifications under clause 3.

9.2 Sheath slackness & Core looping tendency: The slackness of sheath of the finished cordage shall not be more than 3mm displacement of the mark

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when tested as per method given at Appendix 'C' of this specification. All the test specimens should satisfy the requirement.

9.3 pH Value : pH value of the finished cordage shall be within the range of 5.5 to 8.5, when tested as per IS 1390.

9.4 Melting Point: The melting point of nylon yarn used in the manufacture of the tapes shall not be less than 215°C for nylon 6 and 247°C for nylon 66.

9.5 Sealed Sample: If, in order to illustrate or specify the un-measurable characteristics like general appearance, feel, etc of the tapes, sample has been agreed upon and sealed, the supply shall be in conformity with the sample in such respects.


9.5.1 The custody of the sealed sample shall be a matter of prior agreement between the buyer and the seller.

10.0 MARKING

10.1 Each hank/ball prior to being offered for inspection shall legibly be marked by the supplier with his name, trade mark, date of manufacture, length of the hank/ball, DS Cat. Number and nomenclature of the store.

11.0 QUALITY

11.1 Any portion of the sample drawn from a consignment, on examinations, shall show its conformity to the particulars furnished in Table under Appendix 'A' and Clause 9.

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12.0

PRE-INSEPCION OF STORES/CONSIGNMNET

12.1

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 thorough pre-inspection of each lot before actually tendering the same for inspection to the inspecting officer nominated under the terms of the contract. A declaration by the contractor that necessary pre-inspection has been carried out on the stores tendered, will be submitted along with the challan. The declaration will also indicate the method followed in carrying out pre-inspection showing the features checked/tested and will have the test certificate attached to the challan/declaration.

12.2

If the Inspecting Officer finds that pre-inspection of the consignment as required above has not been carried out, the consignment is liable for rejection.

13.0

SAMPLING

13.1

The manufacturer / supplier shall tender stores duly numbered and arranged in such a way that all the units are easily accessible to the Inspector.

13.2


For carrying out full laboratory tests, the hanks/balls selected as in column 2 of the table no. 1 given below under head lot size, shall constitute the test sample.

13.2.1

The Inspector shall draw samples for full tests from the bulk lot at random using the technique of simple random sampling as given in IS 4905.

13.2.2

The length of sample for subjecting to full tests shall be 5m.

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- 13.3 The remaining hanks/balls of the lot shall be subjected to breaking load test only.
- 13.3.1 The length of sample for breaking load test shall be 3m.
- 13.3.2 Lot Size:

Table 1

No. of Units (In hanks/rolls)	Sample size for full tests
Up to 25	5 or lot size whichever is less
26 to 50	8
51 to 90	13
91 to 150	20
151 to 280	32
281 to 500	50
501 to 1200	80
1201 and above	125


- 13.4 The hanks shall be supplied in continuous length of 100 metre or its multiples. However, 5% of the total lot may be accepted in minimum 70 m length.

14.0 **CRITERIA FOR CONFORMITY**

- 14.1 All the sample units drawn as per clause 13 above shall be tested/examined to the relevant requirement / specification. If all the sample units are found to conform to the specified particulars as given in the specification, the supply shall be considered to be in conformity, otherwise, not.

15.0 **INSPECTION**

- 15.1 If, on examination, 20 percent of those examined, are found not to conform to this specification in any respect, the whole consignment may be rejected.

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15.2 All hanks/balls not fully in accordance with this specification shall be rejected.


16.0 **WARRANTY**

16.1 The stores supplied, shall be deemed to bear a warranty of the contractor against defective material, poor workmanship and performance for a period of twelve months from the date of receipt of the stores at consignee's depot. If, during the period, the stores supplied are found by the consignee to be defective, the same shall be replaced immediately with stores as per this specification by the contractor at site, free of any charge or cost.

17.0 **PACKAGING**

17.1 Cordage shall be supplied in hanks of continuous length without joints, of 100m or as required by the procuring authority. Each hank shall be packed in a polythene bag as per IS 9738 then secured by line cotton (0.32 cm) to form a unit pack. The appropriate number of unit packs shall be properly arranged in case wood packing (CWP) or corrugated fibre board box provided with liners waterproof. The empty space, if any, shall be filled in with cushioning materials to prevent any movement of the contents inside the case wood packing, and top lid of the case shall be nailed carefully so that the nails do not pierce into the content of the cases. The gross mass of the case shall not exceed 40 kg (packing materials used should be of best trade quality and previously approved by the inspecting officer).

17.2 If ordered for delivery to local Inspection Depot, the cord shall be delivered loose in firm's returnable packs. After inspection, the inspection, the

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accepted supplies shall be packed by Inspection Depot authorities as indicated in Para 17.1 above.

17.3 Before despatch, each CWP or corrugated fibre board box shall legibly and indelibly marked showing following details:




- a) Nomenclature and Cat number of the store.
- b) Quantity packed in each CWP or corrugated fibre board box.
- c) Serial no. of CWP.
- d) Month and year of packing.
- e) Name and trade mark of the manufacturer.
- f) Gross mass of CWP in kg.
- g) Name and address of the consignee.
- h) Inspection Note number and date.

18.0 **DEFENCE STORES CATALOGUE NUMBER**

18.1 Not yet allotted.


19.0 **SUGGESTION FOR IMPROVEMENT**

19.1 Any suggestion for improvement of this document may be forwarded to the Director, ADRDE, Agra Cantt - 282 001.

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Appendix 'A'

Length, m	No. of spindles	No. of Sheath ends	No. of Core ends	Mass, max, g/100m	Breaking Load on 15 cm test length, min, N	Extension at Break, min, %	Sheath Yarns		Core Yarns		Plaits /dm
							Nominal Linear Density, Tex ($\pm 10\%$)	Twist in yarn (TPM)	Nominal Linear Density, Tex ($\pm 10\%$)	Twist in yarn (TPM)	
100 or as agreed	32	32	7	510	1785	25	23.3x1x3	Single: 330 \pm 15% Ply: 240 \pm 15%	93.3x3	Ply: 160 \pm 10%	105 \pm 5


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CLASSIFICATION OF DEFECTS

1.0 The following defects found in meter by meter examination are classified as major / minor.

Major / Minor defects detectable visually during inspection

Defects	Description	Major	Minor
Abrasion	Abrasion resulting in broken filaments, rupture of individual yarn	X	
Broken and missing threads	Any broken and protruding thread from the surface of the cord Any missing thread	X	
Coarse or light ends	One end over 0.10 m. long	X	
	Two or more ends	X	
	Two ends over. 05m long	X	
	One end 0.10 m. long		X
	Two ends 0.05m. long		X
Double end	Two or more additional ends along full length	X	
	One additional end along full length		X
Slack end	Two or more for a minimum of 13 mm in length	X	
	Two or more for less than 13 mm in length		X
Kinks	Any kink	X	
Loops, snarles, (per 10 linear meter)	Over 1	X	
	Only one		X
Slack or loose ends (per 10 linear meter)	Over 2 meter	X	
	2 m maximum		X
Knots or plied yarns	Over 1 knot in plied yarn	X	
	One knot in plied yarns		X
Light place pull down step marks or un even plaits	Over 5 cm Upto 5 cm	X	X


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Appendix 'B'

Defects	Description	Major	Minor
Tight ends	One end over 0.25 m long	X	
	Two or more tight ends	X	
	One end 0.25 m long		X
Spot stain	Single thread 40 cm or more in length	X	
	Single thread up to 40 cm in length		X
	Double threads 20 cm or more in length	X	
	Double threads up to 20 cm in length		X
	Two threads over 12 cm in length	X	
	Two threads up to 12 cm in length		X
Smash	Any smash	X	
Wrong Draw	Extending for more than 25 cm	X	
	Extending up to 25 cm		X

2.0 Acceptance of hanks / balls with defects

- 2.1 Each hank/ ball shall be measured for its length. The shorter length than that of the specified, shall be segregated and rejected.
- 2.2 Each hank / ball shall be visually examined for defects as described in clause 1 above. No hank / ball shall contain more than 5 major defects per 100 m or 18 minor defects per 100 m. For this purpose, all the hanks / balls shall be visually examined meter by meter and the defects classified in accordance with clause 1 above. The unit or product for examination shall be one linear meter. For each unit of product, the defects shall be counted as follows:


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- i) One major defect and one minor defect shall be counted as one major defect.
- ii) Three or more minor defects shall be counted as one major defect.
- iii) A continuous major defect shall be counted as one major defect for each unit of product or fraction thereof in which it occurs.

2.2.1 Each major defect shall be flagged by a red string. Each minor defect shall be flagged by a blue string. Three or more minor defects occurring per linear meter shall be considered as a major defect and shall be flagged by a red string.

2.2.2 Flag allowance

2.2.2.1 An allowance of 50cm shall be claimed for each major defect except for continuous defect for which an allowance shall be given of 1m for each linear metre in which it occurs. An allowance of 16cm shall be claimed for each minor defect.

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Appendix 'C' (Clause 9.2)

METHOD FOR DETERMINATION OF SHEATH SLACKNESS AND CORE LOOPING TENDENCY

C-1 Test Specimens

For the purpose of this test, a piece of cord approximately 2 m in length, cut from each ball or hank in the test sample shall constitute the test specimens.

C-2 Procedure

As per para B-2.1 to B-2.9 of Annex B of IS 4227.

C-3 Report

Report the lot in conformity with the requirement of clause 9.2.