		Specn No. ADRDE/SPECN/1983/71(a)		Revision no: 1 Dated:
Prepared By: <i>Dev Kishan Bairwa</i> Dev Kishan Bairwa Sc 'B'	<i>P.K. Mallik</i> P.K. Mallik Sc 'D'	Reviewed By: <i>Gaurav Singh</i> Gaurav Singh Sc 'F', GD, TGTE	Issue: Dated:	Page 1 of 10

Government of India
Ministry of Defence

Specification
For

Cordage Nylon Braided 2940N Undyed


Approved by

[Handwritten Signature]

Sc 'G' & Associate Director




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', Column 7 & Column 9</u> For : Extension at break: 25±5% Plaits/dm: 40 Read: Extension at break: 20%, min Plaits/dm: 38, min	Director ADRDE	GD, TGTE	
2	<u>Appendix 'A', Column 11</u> For : Material: Nylon 66 Read: Material: Nylon 6 / Nylon66	Director ADRDE	GD, TGTE	

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0. FOREWORD

- 0.1 This specification is the revision of specification no. ADRDE/SPECN/71 on the basis of feedback from user and practical problem faced in supplies.
- 0.2 This specification has been prepared by a special committee, reviewed and approved by Group Director, Technology Group (Textile Engineering), ADRDE, Agra.
- 0.3 This specification would be used for manufacture inspection and procurement of cordage nylon braided 2940N undyed against Defence requirements.
- 0.4 In case of any discrepancy between this specification and any sample or pattern, this specification shall be taken as correct.
- 0.5 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.
- 0.6 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.
- 0.7 Copies of this specification can be obtained 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.
- 0.7 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.

1. SCOPE


- 1.1 This specification covers the requirement of cordage nylon braided 2940N undyed used in the manufacturing of Jaguar Pilot Parachutes. It can also be used in the other Aerial Delivery Applications considering its suitability.

2. RELATED SPECIFICATIONS

- 2.1 Reference is made in this specification to:
- i. IS: 2 Rules for rounding off numerical values.
 - ii. IS: 6359 Method for Conditioning of textiles.
 - iii. IS: 7071 pt 1 to 3 Ropes and cordages – Methods of Physical test.
 - iv. IS: 7071 pt 4 Physical tests for Ropes & cordages – Breaking load & elongation at break.
 - v. IS: 4227 App. 'D' Method for determination of sheath slackness & core looping tendency.
 - vi. IS: 1390 Method for determination of pH value of aqueous extract of textile material (cold method).
 - vii. IS: 5762 Method for determination of melting point and melting range.
 - viii. IS: 7151 Specification for corrugated fibre board boxes for para dropping of supplies.
 - ix. IS: 9738 Polythene bages.
- 2.2 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. REFERENCE STANDARD

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

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4. MATERIAL

- 4.1 The basic material shall be Nylon 6/Nylon 66, bright, high tenacity, multi filament (8.5 gpd minimum) yarn suitably twisted to 100 TPM minimum to meet the requirements stipulated at clause 7. One spool of about 200 metre 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 5.2)

5. MANUFACTURE

- 5.1 Nylon yarn used in the manufacture of the cordage shall be of Du Pont or its equivalent standard manufacture's product that will ensure the compliance of the cordage with the requirement of this standard.
- 5.2 The cordage shall be evenly braided under suitable tension. The tension given to the yarn during braiding shall be intimated along with the processing/manufacturing details. A piece of ten metre sample along with the test results shall be forwarded as an advance sample for approval.
- 5.3 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.

6. WORKMANSHIP AND FINISH

- 6.1 The cordage shall have minimum braiding defects. The braiding ends shall be free from knots, slub and stains. There shall be no broken threads throughout the length of cordage. For detail classification of defects, appendix 'B' of this specification may be consulted.

7. REQUIREMENTS

- 7.1 The cordage shall conform to the particulars given in Appendix 'A', when tested in accordance with the methods mentioned in Related Specifications under clause 2.
- 7.2 Slackness of sheath: The slackness of the sheath of the finished cordage shall not be more than 5mm displacement of the mark when tested.
- 7.2.1 Core Looping Tendency: The cordage should satisfy the requirement of non core-looping and non-penetration of sheath by core thread when tested by the relevant method.
- 7.3 pH Value: pH value of the finished cordage shall be in the range of 5.5 to 8.5 when tested as per the relevant method.
- 7.4 Melting Point: The melting point of the nylon yarn used in the manufacturing of the cordage shall be 250±6°C.
- 7.5 Sealed Sample: If, in order to illustrate or specify the un-measurable characteristics like general appearance, feel etc. of the cordage, sample has been agreed upon and sealed, the supply shall be in conformity with the sample in such respects.
- 7.5.1 The custody of the sealed sample shall be a matter of prior agreement between buyer and the seller.

8. MARKING


- 8.1 Each piece, prior to being offered for inspection, shall legibly be marked by the supplier with his name, initials or recognised trade mark, the year of manufacture, brief nomenclature, DS Cat. number of the store and length of the piece along with the number of flags contained in the piece.

9. QUALITY

- 9.1 On examination of sample taken from any portion of consignment, shall show that the cordage conforms to the requirements of clause 7 above.

10. PRE-INSEPCION OF STORES/CONSIGNMNET

- 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 thorough pre-inspection of each lot before actually tendering the same for inspection to the inspecting officer nominated under the

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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.

10.2 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.

11. SAMPLING

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

11.2 The samples shall be drawn lot wise for carrying out tests specified in this standard. Unless otherwise agreed to between the buyer and the seller, the lot shall be defined under respective sampling plans as detailed below. The cordage shall be in continuous length without joints of not less than 100 m or its multiple or as agreed between the buyer and the seller.

However, shorter cuts may be allowed in accordance with the following schedule or as agreed between the buyer and the seller:-

90 % of the total supply in length of 100 m

10 % of the total supply in length of 50 m or above

11.3 Sampling Plan 'A'

11.3.1 Lot - The total length of the cordage manufactured from same type of yarn purchased from the same supplier/manufacturer and of same braiding construction and finish, delivered to a buyer against one dispatch note shall constitute a lot.

11.3.2 Each hank/ball of the lot shall be measured for its length.

11.4 Sampling Plan 'B'

11.4.1 Lot - All the hanks/balls of cordage manufactured from same type of yarn purchased from the same supplier/manufacturer and of same braiding construction and finish, delivered to a buyer against one dispatch note shall constitute a lot.

11.4.2 Five metres samples shall be drawn from each hank/ball for carrying out the following tests:

a) Mass

b) Breaking load & Extension at break

11.5 Sampling Plan 'C'

11.5.1 Lot - The quantity of cordage manufactured from the same type of yarn purchased from the same supplier/manufacturer and of the same braiding construction and finish, delivered to a buyer against one dispatch note shall constitute a lot.

11.5.2 One samples of 5 metres length shall be selected from any hank/ball of a lot for carrying out the following tests:

a) Total no. of ends

b) No. of ends per spindle.

c) Plaits/dm

d) Linear density of yarn (core & sheath)

e) Yarn Tenacity (core & sheath)


f) TPM (core & sheath)

g) Construction

h) Slackness of sheath and core looping tendency

i) pH value

j) Type of basic material

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12. CRITERIA FOR CONFORMITY

- 12.1 All the sample units drawn as per clause 11.2 above, shall be tested/examined to the relevant requirement/specification. The lot shall be considered to be in conformity if the requirements given in clause 7 are satisfied.

13. INSPECTION

- 13.1 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.

14. WARRANTY

- 14.1 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.
- 14.2 If, during the period, the stores supplied are found by the consignee to be defective, the same shall be replaced immediately with serviceable stores by the contractor at site, free of any charge or cost.

15. PACKAGING


- 15.1 Each ball/hank shall be wrapped with polythene bag as per IS: 9738 and secured by line cotton (0.32 cm) to form a unit pack. Suitable number of such unit packs shall then be wrapped with paper craft wrapping and placed in corrugated fibre-board box as per IS: 7151 of suitable size provided with line waterproof bag. The gross mass of the box shall not exceed 40 kg. The empty spaces if any shall be filled in with cushioning material to prevent any movement of the contents inside the corrugated fibre board box and the top lid of box shall be properly fixed with adhesive tape. The box packing shall be made secured by fastening with suitable nylon tape.
- 15.2 Packing material used, should be approved by Inspecting Officer. If ordered for delivery to a local inspection depot, the store shall be delivered in the same fashion as stated above in Cl no. 15.1. After inspection, the accepted supplies shall be packed by the inspection depot concerned as indicated in para. 15.1 above.
- 15.3 Before dispatch, each box of corrugated fibre board packing shall be legibly and indelibly marked, showing following details:
- Nomenclature and D S Cat number.
 - Quantity packed in each corrugated fibre board box.
 - Serial no. of the corrugated fibre board box.
 - Month and year of packing.
 - Name and trade mark of the manufacturer.
 - Gross mass of each corrugated fibre board box in Kg.
 - Name and address of the consignee.
 - Inspection Note number and date.

16. DEFENCE STORES CATALOGUE NUMBER

- 16.1 Not yet allotted.


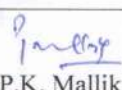
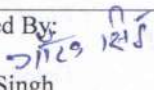
17. SUGGESTION FOR IMPROVEMENT

- 17.1 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,	No. of Spindle	Total no. of Sheath ends	No. of Core ends	Mass, max. g/100m	Breaking Load, min.	Extension at break, min.	Tex of yarn (with a tolerance of -5% to +10%)	Plaits/dm, min.	Construction	Material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
m										
100 or as agreed (ref. clause 11.2)	16	16 (8 ends of Type I and 8 ends of Type II)	4	620	2940	20	Type I - 186.7x2 Type II - 186.7x1	38	Braided	Nylon 6/ Nylon 66

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APPENDIX 'B'

CLASSIFICATION OF DEFECTS

1. The following defects found in metre by metre examination are classified as major/minor.

a) **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 cord	X	
	Any missing thread	X	
Coarse or light ends	Over one end 0.10m long	X	
	Over two ends	X	
	Two ends over 0.05m long	X	
	One end 0.1m 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 13mm in length	X	
	Two or more for a less than 13mm in length		X
Kinks	Any kinks	X	
Loop, snarles, slack or loose ends (per 10 linear metres)	Over 1	X	
	Over 2 metre	X	
	2m maximum		X
	Only 1		X
Knots or Plied yarn	Over 1 knot in plied yarn	X	
	One knot in plied yarn		
Light place pull down, step marks or uneven plaits	Over 5cm	X	
	Upto 5cm		X
Tight ends	Over 1 end 0.25m long	X	
	Two or more tight ends	X	
	One end 0.25m long		X
Spot, stain	Single thread 40cm or more in length	X	
	Single threads 20cm or less in length		X
	Double thread 20cm or more in length	X	
	Double thread upto 20cm or less in length		X
	Over two threads 12cm or more in length	X	
	Two threads less than 12cm in length		X
Smash	Any smash	X	
Wrong draw	Extending for more than 25 cm	X	
	Extending upto 25 cm		X

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2. Acceptance of hank/ball with defects

2.1 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 metre by metre and the defects classified in accordance with clause 1 above. The unit of product for examination, shall be one linear metre. For each unit of product, the defects shall be counted as follow:

- 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 there of in which it occurs.

2.1.1 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 metre shall be flagged by a red string.

An allowance of 50 cm shall be claimed for each major defect flagged except for continuous defects, which shall be given an allowance of one metre for each metre in which it occurs. An allowance of 16 cm shall be claimed for each minor defect flagged.