

ADRDE/SPECN/74(a)

Raksha Mantralaya
Ministry Of Defence

Provisional Specification
For

**Cordage Polyester Braided 318 kgf BS, 364 kgf BS and 450 kgf
BS Heat set, Undyed**

Issued By

Director / Nideshak

Hawai Vitan Anusandhan Avam Vikas Sansthanan

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Aerial Delivery Research and Development Establishment

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Amendment No.	Sub heading to which amendment pertains	Authority	Incorporated by Name & Rank in Block letters	Initials
1	ADRDE/ SPECN/74(a)		1. Sh. SK Pal, Scientist 'E' 2. Sh. SP Singh, Scientist 'E' 3. Sh. Gaurav Singh, Scientist 'C' 4. Sh. Narayan Singh-II, TO 'B' 5. Sh. Mahesh Kumar Verma, STA 'A'	

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Cordage Polyester Braided 318 kgf, 364 kgf and 450 kgf Heat Set Undyed

0.0 FOREWORDS

- 0.1 This specification will supercede existing Specification ADRDE/Specn./74.
- 0.2 In this specification, variety no. 3 i.e. Cordage Polyester Braided, 450kgf BS has been added. Existing varieties 1 & 2 have been amended w.r.t. Mass, Extension at break % and construction (i.e. core, denier of yarn, no. of plaits) has been amended.
- 0.3 This specification has been prepared by a special committee at ADRDE and approved by the Director, ADRDE, Agra.
- 0.4 This specification would be used for manufacture inspection and procurement of Cordage Polyester Braided 318 kgf, 364kgf and 450 kgf Heat Set Undyed against Defence requirements.
- 0.5 In case of any discrepancy between this specification and any sample or pattern, this specification shall be taken as correct.
- 0.6 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.
- 0.7 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.
- 0.8 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.
- 0.9 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.

1.0 SCOPE

- 1.1 This specification covers the requirement of Cordage Polyester Braided 318 kgf, 364kgf and 450 kgf Heat Set Undyed used in the manufacture of Combat Face Fall (CFF) system. It can also be used in other Aerial Delivery applications, considering its suitability.
- 1.2 This specification has to be read in conjunction with Specification no. ADRDE/Specn/83.

2. RELATED SPECIFICATIONS

- 2.1 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: 7071 Ropes and cordages - Methods of Physical test
Part I to 3

iv.	IS: 7071 Part 1 to 3	Physical test for Ropes and cordages. Breaking load and Elongation at break
v.	IS: 4227 App. 'D'	Method for determination of platts per decimeter
vi.	IS : 1390	Methods for determination of pH value of aqueous extracts of textile materials (cold method)
vii.	IS : 5762	Methods for the 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 bags.

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.

4. MATERIAL

4.1 The basic material shall be polyester, bright, high tenacity (8 gpd minimum for fine yarn and 8.0 gpd min. for coarse yarn), multi filament yarn shall be 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 Polyester yarn used in the manufacture of the cordage shall be from standard manufactures' product that will ensure the compliance of the cordage with the requirements 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. The overall structure of the cordage shall be firm and regular. **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 manufacturing defects. The braiding ends shall be free from knots, slubs and stains. There shall be no broken threads through out the length of cordage. For detail classification of defects, appendix 'B' of this specification may be consulted. The cordages shall be suitably heat set as per Para 6 and stipulated condition for respective items at Table 1 of Specification no. ADRDE/SPECN/83.

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. The cordage shall also conform to the requirements of Para 6.1 of Specification no. ADRDE/SPECN/83.
- 7.2 **Slackness of sheath:** The slackness of sheath of the finished cordage shall not be more than 5 mm displacement of the mark.
- 7.2.1 **Core Looping Tendency:** The cored cordage should satisfy the requirements of non-core looping and non-penetration of sheath by core thread when tested by the relevant method (this is to be mentioned in case of cordage with core only).
- 7.3 **pH Value:** pH value of the finished cordage shall be within the range of 5.5 to 8.5 when tested as per the relevant method.
- 7.4 **Melting Point:** The melting point of polyester yarn used in the manufacture of the cordage shall be $258 \pm 5^\circ\text{C}$.
- 7.4.1 The melting point of the nylon yarn shall be determined according to Appendix B of IS : 1843-1963.
- 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 the 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 recognized 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-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 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.

- 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.

11.0 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 as agreed to between the buyer and the seller.

However, shorter cuts may be allowed in accordance with the following schedule or as agreed to 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 same braiding construction and finish, delivered to a buyer against one dispatch note, shall constitute a lot.

- 11.4.2 One sample of five metre length 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 sample of five metre 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 spindles
- c) Plaits / dm
- d) Linear density of yarn (core and sheath)
- e) TPM (core and sheath)
- f) Construction
- g) Slackness of sheath
- h) pH value
- i) Type of basic material

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 with specification requirement if the particulars given in cl. 7 are satisfied.

13. INSPECTION

13.1 If, on examination of 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 then 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 boxes as per IS: 7551 of suitable size, provided with line water proof 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 sealed with adhesive tape. The packing shall be made secured by fastening it 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 corrugated fibre board box shall be legibly and indelibly marked showing following details :-

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

16. DEFENCE STORES CATALOGUE NUMBER

16.1 Not yet allotted.

17. SUGGESTIONS FOR IMPROVEMENT

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

Place : Agra Cantt

Date : 15/4/48

Handwritten signature
GD / Textile Engg Group
For DIRECTOR
ADRDE, Agra Cantt

APPENDIX 'A'

Vty. no.	Length, min., or agreed, (ref. clause 11.2), m.	No. of spindles	Total no. of ends	No. of Core Ends	Mass, max., g/100 m	Breaking Load, min., Kgf	Extension at break, max., %	Tex of yarn including twist (with a tolerance of -3 to +8 %)	Plaits/dm	Constr-uction
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1.	100	16	16	1	850	318	14	Sheath- 1000 x 4 # Core- 1000 x 1	32±5	Braided
2.	100	15-1*(Red)	16	1	950	364	14	Sheath- 1500 x 3 # Core- 1000 x 1	32±5	Braided
3.	100	15-1*(Red)	16	-	1300	450	14	Sheath- 1000 x 6	32±5	Braided

* One Spindle with all the ends of Red Colour.

Core would be of Black Colour

Note: 1) All spindles should have similar construction (i.e. same denier x same ply)

2) For Heat setting refer specification 30, ADR/DE Specn-83.

CLASSIFICATION OF DEFECTS

1. The following defects found in metre by metre 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	X	
	Any missing thread	X	
Coarse or light ends	Over one end 0.10 m. long	X	
	Over two ends	X	
	Two ends over .05m long	X	
	One end 0.1m. long Two ends 0.05m. long		X 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, Slack or loose ends (per 10 linear metre)	Over 1	X	
	Over 2 metre	X	
	2 m maximum Only one		X 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 uneven plaits	Over 5 cm	X	
	Upto 5 cm of		X
Tight ends	Over 1 end 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 upto 20 cm. or less in length		X
	Double threads 20 cm or more in length	X	
	Double threads upto 20 cm or less in length		X
	Over two threads 12 cm or more in length	X	
	Two threads less than in 12 cm. in length		X
Smash	Any smash	X	
Wrong Draw	Extending for more than 25 cm	X	
	Extending upto 25 cm.		X

2. Acceptance of hanks / balls 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.

2.2 Flag Allowance

2.2.1 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.

2.3 Overall examination

2.3.1 Each ball/hank shall be visually examined for overall defects for uneven braiding through out length.