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| | Specn No. ADRDE/SPECN/1980/4(b) | Revision no: 02 Dated: 28.7.21 |
| Prepared By: <i>Dev Kishan Bairwa</i> Dev Kishan Bairwa, Sc 'B' | Reviewed By: <i>P.K. Mallik</i> P.K. Mallik, Sc 'E' | Issue: 03 Dated: 28.7.21 |

Government of India
Ministry of Defence

Specification
For

Tear Tape Nylon 44mm


Approved by

Gaurav K. Jille
28/07/21

Group Director
Technology Group (Textile Engineering)




Aerial Delivery Research and Development Establishment
Ministry of Defence
Post Box No. 51
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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 'C', Column 2</u> For : Thickness (in mm)(under 250gms/ssq cm): 1.35±0.1 Read: Thickness, under 200g/cm ² pressure, max: 1.45 | Director ADRDE | GD, TGTE | |
| 2 | <u>Appendix 'C', Column 6 & 7</u> For : Count of Yarn: Warp: 140 Tex/2 Weft: 140 Tex/3 Read: Linear Density of twisted yarn (with a tolerance of -5 to +10 %), Tex: Weft: 140x2 | Director ADRDE | GD, TGTE | |
| 3 | <u>Appendix 'C', Column 8</u> For : Total Number of ends: 64 Read: Total no. of ends, min: 64 | Director ADRDE | GD, TGTE | |
| 4 | <u>Appendix 'C', Column 9</u> For : Picks per cm: 5 Read: Pick per cm: 6 (suggested) | Director ADRDE | GD, TGTE | |
| 5 | <u>Appendix 'C', Column 10 & 11</u> For : Twist of warp & weft: not specified Read: Twist of yarn, TPM , warp and weft, minimum: 100 | Director ADRDE | GD, TGTE | |

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0. FOREWORD

- 0.1 This specification is the revision of the specification ADRDE/SPECN/1980/4(a) based on the problem faced and experience gained during production.
- 0.1 This specification has been prepared by a special committee, reviewed and approved by Group Director, Technology Group (Textile Engineering), ADRDE, Agra.
- 0.2 This specification would be used for manufacture inspection and procurement of tape Tear Nylon 44mm against defence requirements.
- 0.3 In case of any discrepancy between this specification and any sample or pattern, this specification shall be taken as correct.
- 0.4 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.
- 0.5 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.
- 0.6 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 woven Tape Tear Nylon 44mm used in the manufacture of parachutes and other miscellaneous Aerial Delivery Equipments.

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: 1954 Methods for determination of length and width of fabrics
 - iv. IS: 7702 Method for determination of thickness of woven and knitted fabrics.
 - v. IS: 1963 Method for determination of threads per unit length in woven fabrics.
 - vi. IS: 1969 Methods for determination of breaking load and elongation at break of woven textile fabrics.
 - vii. IS: 832 Method for determination of twist in yarn.
 - viii. IS: 1390 Method for determination of pH value of aqueous extracts of Textiles (cold method).
 - ix. IS: 7151 Specification for corrugated fibre board boxes for Para dropping of supplies.
 - x. 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 tapes, held by ADRDE, Agra Cantt, shall constitute the reference standard as regards any particulars of properties not noted/defined in this specification.

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4. MATERIAL

- 4.1 The basic material shall be nylon 6 or nylon 66, suitable twisted as per Appendix 'C' to meet the requirement 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 tape shall be of standard manufactures' product that will ensure the compliance of the tape with the requirement of this standard.
- 5.2 The tear tapes shall be evenly woven under suitable tension. The edges of tapes shall be firm and regular. The tension given to the yarn during weaving shall be intimated along with the processing/manufacturing details. A piece of five metre sample along with the test results shall be forwarded as an advance sample for approval.
- 5.3 The tapes 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. FINISH

- 6.1 The tapes shall have minimum weaving defects. The tape when laid on a flat even surface shall be in a straight line without application of any tension. For detail classification of defects, Appendix 'D' of this specification may be consulted.

7. REQUIREMENTS

- 7.1 The tapes shall conform to the particulars given in Appendix 'C', when tested in accordance with the methods mentioned in Related Specifications under clause 2
- 7.2 pH Value : pH value of the finished tape shall be within the range or 5.5 to 8.5, when tested as per the relevant method.
- 7.3 Melting Point: The melting point of nylon yarn used in the manufacture of the tape shall not be less than 215°C for nylon 6 and 247°C for nylon 66.
- 7.4 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.
- 7.4.1 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 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 tape 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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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 roll/piece 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 tapes/cords.

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:


- 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. 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'

METHOD FOR DETERMINATION OF MASS PER METER OF TEAR TAPE NYLON 44MM

Prior to test, the test specimen of tear tape nylon shall be conditioned for not less than 24 hours in an atmosphere having R.H. of $65 \pm 2\%$ and a temperature of $27 \pm 2^\circ \text{C}$. The test specimen so conditioned shall then be subjected for one minute to a load equal to 1% of the breaking load and a specimen of tape shall be cut under tension. The weight per meter of the tear tape nylon shall then be determined.

APPENDIX 'B'

METHOD FOR DETERMINATION OF TEARING LOAD OF TEAR TAPE NYLON 44MM

The specimen sample of Tear Tape Nylon shall be conditioned for not less than 24 hours in an atmosphere having R.H. of $65 \pm 2\%$ and a temperature of $27 \pm 2^\circ \text{C}$. The specimen so conditioned shall then be tested for the tearing load as under.


At the end, about 50mm of the Tear Tape Nylon shall be split in the middle (by cutting its weft thread) and the split ends gripped in an approved BS testing machine of CRT/CRE type. The machine shall be operated at a speed of 300 ± 10 mm/min and the reading for the breaking of weft thread shall be noted. Ten peak values for breaking of every weft thread shall be noted. These readings shall be within the range of 340-640 N as given in the Appendix 'C'

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APPENDIX 'C'

| Width, mm | Thickness, mm | Mass, g/m ² max | Breaking Load, min | Tear Load, N | Linear Density of twisted yarn (with a tolerance of -5 to +10 %). Tex | Total no. of ends, min | Picks per cm (suggested) | Twist of yarn, TPM (minimum) | |
|-----------|---------------|----------------------------|--------------------|--------------|---|------------------------|--------------------------|------------------------------|------|
| mm | mm | g/m | N | N | Warp | Warp | Weft | Warp | Weft |
| (1) | (2) | (3) | (4) | (5) | (6) | (8) | (9) | (10) | (11) |
| 44±1 | 1.45 | 32 | 10000 | 340-640 | 140x2 | 140x2 | 6 | 100 | 100 |

Note: Weave of the tape shall be as per APPENDIX 'E'

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APPENDIX 'D'

CLASSIFICATION OF DEFECTS

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

a) **Major defects detectable visually during inspection**

| Defects | Description | Major |
|---|--|-------|
| Abrasion | Abrasion resulting in broken filaments, rupture of individual yarn and distortion in the orientation of threads | X |
| Broken and missing threads (ends/picks) | Two or more, regardless of length | X |
| Coarse or light filling bar | Extending for more than 13 mm in the length direction or more than 50 % of width resulting in visible differences in thickness | X |
| Floats skips | Single float or skip over 1 cm or more in length | X |
| | Contiguous float, the sequence of which measures 0.5 cm or more in length | X |
| | Any multiple float 5 mm square or more | X |
| Jerked-In filling | Any jerked-in filling occurring 4 times within 25 cm | X |
| Edge cut, torn or frayed | Complete separation of one or more yarns within 3 mm of the edge or at any adjoining point | X |
| Mispick or double pick | Two or more additional picks across full width | X |
| Slack end | Two or more for a minimum of 13 mm in length | X |
| Loose, Irregular and uneven Selvages | Clearly noticeable waviness along selvedge edge when no tension is on selvedge | X |
| Selvage tight | Any clearly noticeable roll of edge or edges when tension is released. | X |
| Spot, stain | Single thread 40 cm or more in length | X |
| | Double threads 20 cm or more in length | X |
| | Over two threads 12 cm or more in length or clearly noticeable area more than 6 mm ² , whichever is greater | X |
| Slubs or strip back* | More than 5 over 1 cm in length | X |
| | Two to five over 2 cm in length | X |
| | One over 5 cm in length | X |
| Smash | Any smash | X |
| Wrong draw | Extending for more than 25 cm | X |

* A strip back is defined as a broken filament (s) wrapped around the remaining yarns forming an enlarged area resembling a slub.

b) **Minor defects detectable visually during inspection**

The classification of the defects defined under clause a) above, may be considered minor, if it exists to a lesser degree than that given under the column 'Description'.

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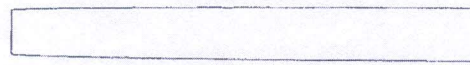
2. Acceptance of rolls with defects

- 2.1 Each roll shall be visually examined for defects as described in a) and b) above. No roll shall contain more than 5 major defects per 100 m or 18 minor defects per 100 m. For this purpose, all the rolls shall be visually examined metre by metre and the defects classified in accordance with a) and b) of Appendix 'B'. 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.
- 2.2 Each major defect shall be flagged by a red string sewn in the selvedge. Each minor defect shall be flagged by a blue string sewn in the selvedge. Three or more minor defects occurring per linear metre shall be flagged by a red string sewn in the selvedge.
- 2.3 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.

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APPENDIX 'E'

TEAR TAPE NYLON 44 MM U/D

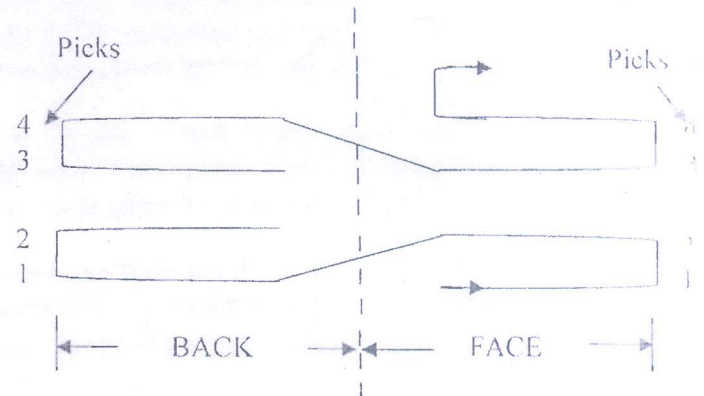


ONE SIDE 2-PLY NARROW FABRIC

| | | | | | | | | |
|-----|---------|---|-----|---|----------|-----|---|---|
| | ← X 1 → | | | | ← X 15 → | | | |
| 8 F | | | X | | | | X | |
| 7 F | X | | | X | | | | |
| 6 B | / | | / O | / | | / O | / | O |
| 5 B | / | O | / | | / O | / | | |
| 4 B | / | | / O | / | | / O | / | O |
| 3 B | / | O | / | | / O | / | | |
| 2 F | | | X | | | | X | |
| 1 F | X | | | X | | | | |
| | F | B | F | B | F | B | F | B |



CENTRE OF TEAR TAPE



ABOVE WEAVE DESIGN REPRESENTS REPEAT OF 8 PICKS & TOTAL ENDS IN FULL WIDTH (TOTAL NO. OF ENDS - 64)

KEY TO MARKS -

X - FACE END UP ON FACE PICK

O - BASE END UP ON BASE PICK

/ - FACE END UP ON BASE PICK

NOTE - TEAR TAPE IS FORMED BY OPENING - UP OF THIS 2 - PLY FABRIC.