

Indian Standard

TEXTILES — BRAIDED NYLON CORDS FOR AEROSPACE
PURPOSES — SPECIFICATION

(Third Revision)

1 SCOPE

1.1 This standard prescribes the constructional details and other requirements of different varieties of scoured and/or dyed nylon cords intended for use in parachutes and in the allied aerial delivery equipment and systems.

1.2 This standard does not specify the type of shade, finish, feel, etc. of the cords (see 4.5).

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards.

3 MANUFACTURE

3.1 Yarn

3.1.1 The material of the yarn, that is continuous multifilament, bright, high tenacity nylon 6 or nylon 66, shall be identified by microscopic and dissolution test as prescribed in IS 667. The linear density of yarns in the core and sheath together with their construction is given in Table 1. The plied yarn shall be twisted as per 3.1.2.

NOTE — In order to ascertain whether nylon type 66 or 6 yarn is used, the method of test for the determination of melting point in accordance with IS 5762 may be followed. The melting point of nylon 66 and nylon 6 shall not be less than 247 °C and 215 °C respectively.

3.1.2 The single yarns shall be suitably doubled and twisted together so that the product complies with the requirements of this standard. The turns per metre (tpm) in the individual yarns except for the varieties no. 11 and 12 shall be as follows:

Sl No.	Nominal Count dtex	Turns per meter tpm (Final)	Tolerance, Percent
(1)	(2)	(3)	(4)
i)	70 × 6	280	± 15

Sl No.	Nominal Count dtex	Turns per meter tpm (Final)	Tolerance, Percent
(1)	(2)	(3)	(4)
ii)	235 × 1	100	Min
iii)	235 × 2	320	± 15
iv)	235 × 3	340	± 15
v)	235 × 4	220	± 15
vi)	235 × 3 × 3	200	± 15
vii)	235 × 5 × 3	280	± 15
viii)	235 × 6	340	± 15
ix)	235 × 6 × 3	200	± 15
x)	940 × 2	160	± 15
xi)	940 × 3	160	± 15
xii)	1 400 × 1	340	± 15
xiii)	1 175	520	± 15
xiv)	1 400 × 3	200	± 15

3.1.2.1 The turns per metre (tpm) for varieties no. 11 and 12 shall be as follows:

Sl No.	Yarn	Single Twist	Ply Twist (Initial)	Ply Twist (Final)
(1)	(2)	(3)	(4)	(5)
i)	Sheath	330	—	240
ii)	Core	40	520	280
iii)	Tolerance, percent	± 15	± 15	± 15

NOTE — Any twist less than 40 tpm is acceptable in intermingled yarn

3.2 Cord

3.2.1 The cord shall be tightly formed in braided construction having uniform tension throughout its length. The core and sheath shall be well formed and free from knots, slubs or stains. The finished cord shall be of uniform round cross-section, clean, smooth to handle and free from all manufacturing defects.

3.2.2 The cords meant for use in personnel parachutes shall be identified by the inclusion of one

black coloured thread in the braiding. The black colour of the thread shall be obtained by dyeing with acid type dyes.

4 REQUIREMENTS

4.1 Construction

The cords shall conform to the requirements as specified in Table 1.

4.2 Slackness of Sheath and Core Looping Tendency

The cords shall be free from slackness of sheath and core looping tendency when tested by the method prescribed in Annex B.

4.3 Length

The length of cord in a ball, hank or bobbin shall be as agreed to between the buyer and the seller. The length shall be determined in accordance with IS 7071.

4.4 The cords shall also conform to the chemical requirements as specified in Table 2.

4.5 Sealed Sample

4.5.1 In order to illustrate the pattern, workmanship, etc., of the cord, if a sample has been agreed upon and sealed, the supply shall also be in conformity with the sample in such respect.

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

5 INSPECTION

5.1 Freedom from Defects

Yarn contained in each unit of ball/hank/bobbin shall be visually examined, metre by metre, for the defects specified in Annex C. No ball/hank/bobbin shall contain more than five major defects per 100 m. The unit of the product for examination shall be one linear metre. For each unit of product, the defects shall be counted as follows:

- a) One major defect along with one or more minor defects shall be counted as one major defect;
- b) Three or more minor defects shall be counted as one major defect;
- c) One or more major defects shall be counted as one major defect; and

- d) A continuous major defect shall be counted as one major defect for each unit of product or fraction thereof in which it occurs.

5.2 Each major defect shall be flagged by a red string sewn in the cord. Three minor defects occurring per linear metre shall be flagged by a red string sewn in the selvage. One metre allowance shall be made for each major defect flagged except for continuous defect which shall be given a two metre allowance for each metre in which defect occurs.

5.3 Each ball/hank/bobbin of supply shall be continuous, without joints, of length not less than what has been specified or agreed upon between the buyer and the seller.

5.4 Overall Examination

Each ball/hank/bobbin shall be visually examined for overall defects as follows:

- a) Spottiness, poor penetration of dye or off shade;
- b) Uneven braiding throughout; and
- c) Unevenness and streakiness of dyeing in excess of that shown by sealed sample (see 4.5) for appearance.

6 PACKAGING

6.1 The cord of varieties 8 to 13 shall be wound in the form of continuous length, knot-free balls or hanks. The other varieties shall be supplied in knot-free continuous length on flanged bobbins. The length of cord to be contained in a ball or hank or bobbins shall be as agreed to between the buyer and the seller.

6.1.1 Each ball or hank shall be packed in a polyethylene bag which shall be heat sealed. The bags shall be wrapped in polyethylene film to form a pack.

6.1.2 Each bobbin shall be wrapped with tissue paper and five such bobbins shall be packed in a polyethylene bag which shall be heat sealed to form a pack.

7 MARKING

7.1 Each pack shall be tied with a suitable label on which the following information shall be marked:

- a) Manufacturer's name, initials, or trade-mark;
- b) Name of the material;

- c) Variety No.;
- d) Length;
- e) Indication of the source of manufacture;
- f) Month and year of manufacture; and
- g) Any other information required by the buyer.

7.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed there under, and the products may be marked with the Standard Mark.

8 PACKING

8.1 An appropriate number of packages shall be placed in a corrugated cardboard carton or in a wooden packing case conforming either to style 2 (b) or 3 (b) of IS 1503 previously covered with one layer of low density polyethylene film of at least 100 µm thickness and conforming to IS 2508 first and then wrapped with one layer of waterproof packing paper conforming to Type I of IS 1398. The voids in the carton or case if any, shall be stuffed with paper cuttings to prevent movement of the contents of the carton or case. The lid shall be nailed to the case and the case bound at two places by baling hoopsropes or wire rope of adequate strength and in the case of cardboard carton the sample shall be bound by suitable strappings.

8.2 The gross mass of the case or carton shall not exceed 100 kg.

9 SAMPLING

9.1 Lot

All the balls, hanks or bobbins of the cords

manufactured from the same type of yarn and of same form of construction and finish delivered to a buyer against one despatch note shall constitute the lot.

9.2 Each ball, hank or bobbin of the lot shall be tested for breaking load and elongation at break and also inspected for defects.

9.3 The number of balls, hanks or bobbins to be selected at random from each lot for requirements other than breaking load and elongation shall be in accordance with Table 3.

9.3.1 The balls/hanks/bobbins selected according to **9.3** shall constitute the test sample for test.

9.3.2 One specimen of 5 metres in length shall be drawn from each sample obtained as per **9.3** and **9.3.1** for carrying out the following tests:

- a) Mass;
- b) Plaits/dm;
- c) Number of spindles and threads (in core and sheath, separately); and
- d) Slackness of sheath and core looping tendency.

10 CRITERIA FOR CONFORMITY

10.1 The lot shall be declared conforming to the requirements of this standard, if the conditions given in 10.1.1 and 10.1.2 are satisfied.

10.1.1 The average of the observed values of breaking load shall be within the limit specified. No individual reading shall be less than 95 percent of the minimum value specified under col (10) of Table 1.

10.1.2 All the test specimens tested for the remaining characteristics shall also satisfy the relevant requirements.

IS 4227 : 2024

Table 1 Requirements of Braided Nylon Cords/Cordages

(Clauses 3.1.1, 4.1, 10.1.1 and Annex D)

Sl No.	Variety No.	Nominal Linear Density of Yarn (see Note 1)		No. of Spindles	No. of Ends		Plaits /dm	Mass, Max. (see Note 2) g/100 m	Breaking Load on 15 cm Test Length, Min		Elongation at Break, Percent, Min, (see Note 2)
		Core dtex (3)	Sheath dtex (4)		Sheath (6)	Core (7)			(10)	(11)	
(1)	(2)			(5)	(6)	(7)	(8)	(9)	(10)	(11)	
i)	1	-	235 x 1 to 235 x 2	16	16	-	90 ± 10	76	226	25	
ii)	2	-	330 x 3 or 165 x 2 x 3	8	8	-	51 ± 1	91	295	25	
iii)	3	-	235 x 1	16	32	-	90 ± 10	91	345	20	
iv)	4	-	Alternate ends of 235 x 1 and 235 x 2	32	32	-	105 ± 5	137	500	20	
v)	5	235 x 3 x 3	235	16	32	2	70 ± 10	140	452	25	
vi)	6	-	Alternate ends of 235 x 3 and 235 x 4	16	16	-	80 ± 10	170	630	25	
vii)	7	235 x 3 x 3	235 x 2	16	32	2	62 ± 8	270	890	25	
viii)	8	-	1 400	16	16	-	65 ± 5	315	1 000	20	
ix)	9	-	940 x 2	16	16	-	40 ± 1	360	1 375	23	
x)	10	940 x 3	12 ends of 940 x 2 4 ends of 940 x 3	16	16	3	47 ± 4	555	1 785	25	
xi)	10A	235 x 3 x 3	235 x 3 x 3	16	16	4					
xii)	11	235 x 5 x 3 or 1 175 x 3	235 x 1 x 3	32	32	7	105 ± 5	570	1 785	30	

Table 1 (Concluded)

Sl No.	Variety No.	Nominal Linear Density of Yarn (see Note 1)		No. of Spindles	No. of Ends		Plaits /dm	Mass, Max. (see Note 2)	Breaking Load on 15 cm Test Length, Min		Elongation at Break, Percent, Min. (see Note 2)
		Core dtex	Sheath dtex		Sheath	Core			N	(10)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
xiii)	12	235 × 5 × 3 or 1 175 × 3	235 × 1 × 3	32	32	9	105 ± 5	665	2 452	30	
xiv)	13	235 × 6 × 3	235 × 3 × 3	16	32	4	43 ± 4	1 110	3 120	25	
xv)	14	940 × 3 or 235 × 6 × 2	32 ends of 940 × 3 and 16 ends of 940 × 2 or 235 × 3 × 3	16	48	4 to 6	27 ± 4	1 665	5 335	25	
xvi)	15	—	940 × 9 for golden 940 × 12 for white (each spindle contains 2 golden and 3 white threads)	8	40	—	10	5 000	12 740	25	
xvii)	Method of Test, Ref to	IS 7071		—	D-3		D-4	IS 1964	IS 7071		

NOTES

- 1 The tolerance of -5 percent for nominal linear density of varieties 11 and 12, and -5 percent for other varieties shall be applicable.
- 2 In case of dyed cords, 5 percent relaxation shall be allowed in mass and elongation at break.