

भारतीय मानक
Indian Standard

IS 6349 : 2024

वस्त्रादि — वायु आकाशीय प्रयोजनों के लिए
नलीदार नायलॉन टेप — विशिष्टि
(दूसरा पुनरीक्षण)

**Textiles — Tubular Nylon Tapes for
Aerospace Applications —
Specification**

(Second Revision)

ICS 49.025.60

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FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Textile Materials for Aeronautical and Related Products Sectional Committee had been approved by the Textiles Division Council.

This standard was first published in 1979 and subsequently revised in 1981. This revision has been brought out in the light of experience gained since its last revision and to incorporate the following major changes:

- a) Requirement for elongation at break has been modified;
- b) Requirement of *pH* for nylon tapes has been incorporated;
- c) Requirement of ends and picks have been modified for Type 1;
- d) Packing and marking clauses have been updated;
- e) All amendments have been incorporated; and
- f) References to standards have been updated.

The composition of the Committee responsible for the formulation of this standard is given in [Annex B](#).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TEXTILES — TUBULAR NYLON TAPES FOR AEROSPACE
APPLICATIONS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard covers requirements for two types of tubular nylon tapes used in the aerial delivery equipment including personnel parachutes.

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 TYPES

Based on the thickness and GSM tubular nylon tapes are classified as follows:

- a) *Type I* — having *Max* 39 GSM and 2.3 mm thickness under a pressure of 200 g/cm²; and
- b) *Type II* — having *Max* 12 GSM and 2.3 mm thickness under a pressure of 200 g/cm².

4 MATERIALS

4.1 The following high tenacity nylon yarns made out of nylon-66 or nylon-6 may be used in the manufacture of nylon tubular tape and number of plies in the yarn shall be as follows:

<i>Sl No.</i>	<i>Type</i>	<i>Denier × Ply of Warp Yarn</i>	<i>Denier × Ply of Weft Yarn</i>	<i>Tenacity, g/Denier (gpd), Min</i>
(1)	(2)	(3)	(4)	(5)
i)	Type I	840 × 2 or 1680 × 1	840 × 1	8.5
ii)	Type II	210 × 1	210 × 5 or 1 050 × 1	6.5
Tolerance, percent		± 10		
Method of test, Ref to		IS 4910 (Part 2)	IS 1670	

4.2 The nylon yarn shall be bright, light and heat resistant and have melting point not less than 247 °C for nylon 66 and not less than 215 °C for nylon-6.

NOTE — In order to ascertain whether nylon-66 or nylon-6 is used the method of test for the determination of melting point as per IS 5762 may be followed.

4.3 The twist in the final ply shall not be less than 100 tpm when tested as given in IS 832 (Part 1).

4.4 The nylon yarn shall be free from stains, finishing and dressing materials.

5 REQUIREMENTS

5.1 The finished nylon tape shall meet the requirements given in [Table 1](#).

5.2 Residual Shrinkage

The residual shrinkage of the nylon tubular tape shall not exceed 2.0 percent when tested in accordance with IS 2977.

5.3 Resistance to Accelerated Ageing

The tubular nylon tape shall not lose more than 25 percent of its original breaking strength when subjected to treatment for accelerated ageing given in Annex E of IS 4727.

5.4 The tubular nylon tape shall not lose more than 25 percent of its original breaking strength after being kept in an oven for one hour at 180 °C ± 3 °C and subsequently conditioned as given in IS 6359.

5.5 Sealed Sample

If in order to illustrate or specify the characteristics like general appearance, colour, feel, etc, of the tubular nylon tape, a sample has been agreed upon and sealed, the supply shall be in conformity with the sample in such respects.

Table 1 Requirements for Tubular Nylon Tape for Aerospace Applications

(Clause 5.1)

Sl No.	Characteristic	Requirement for		Method of Test, Ref To
		Type I	Type II	
(1)	(2)	(3)	(4)	(5)
i)	Length of roll	100 m, or as required by the buyer. 10 percent of the supplies may be made in short length pieces subject to the condition that short length pieces are 20 metre or its multiples.		IS 1954
ii)	Width, mm Tolerance, mm	— 25 (+ 2, - 0) —		
iii)	Thickness, mm, <i>Max</i> under a pressure of 200 g/cm ²	2.3	1.5	IS 7702
iv)	Ends in full width, <i>Min</i>	140	206	IS 1963
v)	Picks/dm, <i>Min</i>	200	170	
vi)	Mass, g/m ² , <i>Max</i> (see Note 1)	39	12	IS 1964
vii)	Breaking load in full width × 20 cm between grips, N, <i>Min</i> (see Note 2)	13 377	2 352	IS 1969 (Part 1)
viii)	Elongation at break, <i>Min</i> , percent (see Note 2)	18		
ix)	Weave	Tubular, plain 1/1		—
x)	Colour fastness to light	5 or better		IS/ISO 105-B01 or IS/ISO 105-B02
xi)	Colour fastness to washing	4 or better		IS/ISO 105-C10 [Test Number A (1)]
xii)	pH	5.5 to 8.5		IS 1390

NOTES

1 Prior to cutting test specimens for mass (g/m²) test, the nylon tubular tape shall be subjected to a tension equal to its one percent specified minimum breaking load for 60 s ± 5 s on a breaking load testing machine.

2 In case of dyed webbing, + 5 percent relaxation shall be allowed in mass and extension at break.

6 PACKING

6.1 Unless otherwise agreed to between the buyer and the seller, the tubular nylon tapes shall be packed as given in 6.2.

6.2 An appropriate number of rolls shall be arranged in a cylindrical bundle and secured by 3 ply jute twine (see IS 1912) to form a pack. A suitable number of such packs shall be arranged and wrapped with polyethylene film of at least 100 microns thickness (see IS 2508) and placed in a wooden packing case of adequate strength, previously lined with one layer of waterproof packing paper

conforming to Type 2 of IS 1398. The empty spaces, if any, in the packing case shall be stuffed with cushioning materials to avoid damage in transit. The case shall be bound by iron hoops or wires. The gross mass of the case shall not exceed 40 kg.

7 MARKING

7.1 Each roll shall provide the following information on a label attached to it:

- Length (m), width (mm) and thickness (mm);
- Date of manufacture in a suitable code;

- c) Manufacturer's name/trade-mark;
- d) Colour and finish, if not grey; and
- e) Any other information desired by the purchaser.

7.2 BIS Certification Marking

The tubular nylon tape rolls 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 thereunder, and the nylon tape rolls may be marked with the Standard Mark.

8 SAMPLING

8.1 Lot

The quantity of tubular nylon tape of the same type and width in a consignment shall constitute a lot.

8.2 Unless otherwise specified in the contract or order, the sampling plan given in [Table 2](#) shall be followed.

8.2.1 Rolls shall be selected at random (*see* IS 4905).

8.2.2 Sub-sample rolls specified in col (5) of [Table 2](#) shall be drawn from the sample rolls selected according to col (3) of the [Table 2](#).

9 NUMBER OF TEST SPECIMENS AND CRITERIA FOR CONFORMITY

9.1 Number of test specimens and criteria for conformity shall be as given in [Table 3](#).

9.2 For breaking load and elongation test, an additional 2 m test sample from each of the sample rolls remaining after drawing the subsample (*see* [8.2.2](#)) shall be taken if so, specified in the contract.

Table 2 Scale of Sampling

(Clauses [8.2](#) and [Table 3](#))

SI No.	No. of Rolls in the Lot	Sample Size	Permissible No. of Defective Rolls in Respect of Tests on Sample Rolls	Sub-sample Size	Permissible No. of Defective Rolls in Respect of Tests on Sub-sample Rolls
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 25	3	0	3	None
ii)	26 to 100	5	0	4	
iii)	101 to 150	8	0	5	
iv)	151 to 300	13	0	7	
v)	301 to 500	20	1	8	
vi)	501 to 1 000	50	1	9	
vii)	Above 1 000	80	2	10	

Table 3 Number of Test Specimens and Criteria for Conformity

(Clause [9.1](#))

SI No.	Characteristic	Number of Samples	Criteria for Conformity
(1)	(2)	(3)	(4)
i)	Length, linear density, width, mass, thickness, ends, weave, picks and plies	According to col (3) of Table 2	Non-conforming rolls not to exceed corresponding number given in col (4) of Table 2
ii)	Breaking load, elongation, ageing, colour fastness, shrinkage	According to col (5) of Table 2	All the rolls to satisfy the relevant requirements

ANNEX A

(Clause 2)

LIST OF REFERRED STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
IS/ISO 105-B01 : 2014	Textiles — Tests for colour fastness: Part B01 Colour fastness to light: Daylight	IS 1964 : 2001	Textiles — Methods for determination of mass per unit length and mass per unit area of fabrics (<i>second revision</i>)
IS/ISO 105-B02 : 2014	Textiles — Tests for colour fastness: Part B02 Colour fastness to artificial light: Xenon arc fading lamp test	IS 1969 (Part 1) : 2018/ISO 13934-1 : 2013	Textiles — Tensile properties of fabrics: Part 1 Determination of maximum force and elongation at maximum force using the strip method (<i>fourth revision</i>)
IS/ISO 105-C10 : 2006	Textiles — Tests for colour fastness: Part C10 Colour fastness to washing with soap or soap and soda	IS 2508 : 2016	Polyethylene films and sheets — Specification (<i>third revision</i>)
IS 832 (Part 1) : 2021/ISO 2061 : 2015	Textiles — Determination of twist in yarns: Part 1 Direct counting method (<i>third revision</i>)	IS 2977 : 1989	Fabrics (other than wool) — Method for determination of dimensional changes on soaking in water (<i>first revision</i>)
IS 1390 : 2022/ ISO 3071 : 2020	Textiles — Determination of pH of aqueous extract (<i>third revision</i>)	IS 4727 : 2020	Textiles — Nylon webbing for aeronautical purposes — Specification (<i>first revision</i>)
IS 1398 : 1982	Specification for packing paper water proof, bitumen-laminated (<i>second revision</i>)	IS 4905 : 2015/ ISO 24153 : 2009	Random sampling and randomization procedures (<i>first revision</i>)
IS 1670 : 1991	Textiles — Yarn — Determination of breaking load and elongation at break of single strand (<i>second revision</i>)	IS 4910 (Part 2) : 2023	Tyre yarns, cords and tyre cord fabrics made from man-made fibres — Methods of test: Part 2 Linear density (<i>second revision</i>)
IS 1912 : 2023	Textiles — Country jute twine — Specification (<i>third revision</i>)	IS 5762 : 1970	Methods for determination of melting point and melting range
IS 1954 : 2024/ ISO 22198 : 2006	Textiles — Fabrics — Determination of width and length (<i>third revision</i>)	IS 6359 : 2023	Method for conditioning of textiles (<i>first revision</i>)
IS 1963 : 1981	Methods for determination of threads per unit length in woven fabrics (<i>second revision</i>)	IS 7702 : 2012/ ISO 5084 : 1996	Textiles — Determination of thickness of textiles and textile products (<i>first revision</i>)

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ANNEX B

(Foreword)

COMMITTEE COMPOSITION

Textile Materials for Aeronautical and Related Products Sectional Committee, TXD 13

<i>Organization</i>	<i>Representative(s)</i>
Aerial Delivery Research and Development Establishment (DRDO), Agra	DR MANOJ KUMAR (<i>Chairperson</i>)
Aerial Delivery Research and Development Establishment (DRDO), Agra	SHRI GAURAV SINGH SHRI PRASANTA KUMAR MALLIK (<i>Alternate</i>)
Defence Materials and Stores Research and Development Establishment, Kanpur	SHRIMATI PRIYANKA KATIYAR SHRI BISWA RANJAN DAS (<i>Alternate</i>)
Directorate General of Aeronautical Quality Assurance, Ministry of Defence, New Delhi	SHRI DALJEET SINGH DR SUBHASH (<i>Alternate</i>)
Directorate General of Civil Aviation, New Delhi	SHRI LALIT GUPTA
Directorate General of Quality Assurance, New Delhi	SHRI PURUSHOTTAM DE SHRI S. S. KASHYAP (<i>Alternate</i>)
Indian Space Research Organization - Vikram Sarabhai Space Centre, Thiruvananthapuram	DR SANTHOSH B. SHRI ANIL PAINULY (<i>Alternate</i>)
Kusumgar Corporates Private Limited, Vapi	SHRI SIDDHARTH Y. KUSUMGAR DR M. K. TALUKDAR (<i>Alternate</i>)
Motilal Dulichand Private Limited, Kanpur	SHRI SHAILENDRA MISRA SHRI SUNIL PRAHLADKA
Northern India Textile Research Association, Ghaziabad	DR M. S. PARMAR
Office of the Textile Commissioner, Mumbai	SHRI IQBAL AHMED SHRI SANJAY CHARAK (<i>Alternate</i>)
Ordnance Parachute Factory, Kanpur	SHRI K. K. TOPPO SHRI SACHIN KHORIA (<i>Alternate</i>)
Oriental Synthetic and Rayon Mills Private Limited, Navi Mumbai	SHRIMATI SMITA YEOLE SHRI SAURABH PHADTARE (<i>Alternate</i>)
Ratanmoti Texfab India Private limited, Ichalkaranji	SHRI RITESH NAVAL PATNI SHRI SHUBHAM VIDYADHAR KHARAGE (<i>Alternate</i>)
Shingora Textiles Private Limited, Ludhiana	SHRI AMIT JAIN SHRI TEJ NARAYAN (<i>Alternate</i>)
SRF Limited, Gurugram	SHRI SIVA KUMAR SHRIMATI ANGELINA DIVYA (<i>Alternate</i>)
Swadeshi Niwar Mills, Kanpur	SHRI YASH KHANDELWAL SHRI VINEET KHANDELWAL (<i>Alternate</i>)

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<i>Organization</i>	<i>Representative(s)</i>
Thanawala and Company, Mumbai	SHRI HEMAL M. THANAWALA SHRI UPENDRA K. THANAWALA (<i>Alternate</i>)
The Synthetic and Art Silk Mills Research Association, Mumbai	DR MANISHA MATHUR SHRIMATI ASHWINI SUDAM (<i>Alternate</i>)
Urja Products Private Limited, Ahmedabad	SHRI ANSHUL NANAVATY
Uttar Pradesh Textile Technology Institute, Kanpur	PROFESSOR MUKESH KUMAR SINGH
Vardhaman Yarn and Threads Limited, Gurugram	SHRI ANU HANDA
Viraj Syntex Private Limited, Kanpur	SHRI AMIT SHRI ANKIT KUSHWAHA (<i>Alternate</i>)
BIS Directorate General	SHRI J. K. GUPTA, SCIENTIST 'E'/DIRECTOR AND HEAD (TEXTILES) [REPRESENTING DIRECTOR GENERAL (<i>Ex-officio</i>)]

Member Secretary
SHRI GOURAV MISHRA
SCIENTIST 'B'/ASSISTANT DIRECTOR
(TEXTILES), BIS

Bureau of Indian Standards

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