

IS : 6349 - 1981

(Reaffirmed 2003)

Indian Standard

**SPECIFICATION FOR
TAPE, NYLON, TUBULAR FOR AEROSPACE
APPLICATIONS**

(First Revision)

First Reprint AUGUST 2005)

UDC 677.754 : 677.494.675 : 629.136.1

© Copyright 1982

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3

January 1982

AMENDMENT NO. 1 JULY 1984

TO

IS:6349-1981 SPECIFICATION FOR TAPE, NYLON, TUBULAR
FOR AEROSPACE APPLICATIONS

(First Revision)

Alteration

*(Page 4, clause 2.5, under column 'Weft', against
Type II)* - Substitute the following for the existing:

'5 or any number of ply, the resultant tex (denier)
should be 117 tex (1 050 d)'.

(TDC 27)

Sita Fine Arts Pvt Ltd.

Indian Standard
SPECIFICATION FOR
TAPE, NYLON, TUBULAR FOR AEROSPACE
APPLICATIONS
(First Revision)

Textile Material for Aerospace Purposes Sectional Committee, TDC 27

Chairman

SHRI K. B. GANESAN

Representing

Office of the Director General of Civil Aviation,
New Delhi

Members

SHRI P. R. CHANDRASEKHAR (<i>Alternate to</i> Shri K. B. Ganesan)	
SHRI M. S. EKBOTE	Indian Airlines, New Delhi
SHRI I. HUSSAIN	Ministry of Defence (R & D)
SHRI S. K. GANGULI (<i>Alternate I</i>)	
SHRI SWADESH KUMAR (<i>Alternate II</i>)	
SHRI K. K. KAPOOR	Ministry of Defence (DGI)
SHRI P. C. AGRAWAL (<i>Alternate</i>)	
SHRI P. K. KURIAN	Hindustan Aeronautics Ltd, Bangalore
SHRI G. L. MOONDRA	Jaya Shree Textiles & Industries Ltd, Rishra
SHRI K. GOPINATH (<i>Alternate</i>)	
SHRI GAUTAMBHAI NANAVATI	Unnati Corporation Ltd, Ahmadabad
SHRI S. G. RATNAM	Madura Coats Ltd (Thread Group), Koratti
REPRESENTATIVE	Ahmadabad Textile Industry's Research Association, Ahmadabad
REPRESENTATIVE	Swastik Rubber Products Ltd, Pune
SHRI G. H. RODRICKS	Fibreglass Pilkington Ltd, Bombay
SHRI G. RAVISHANKAR (<i>Alternate</i>)	
SHRI B. SAMPATH	Ministry of Defence [DTD & P (Air)], New Delhi
SHRI R. C. SHARMA (<i>Alternate</i>)	
SHRI V. G. SARUKKAI	Aero Marine Industries Pvt Ltd, Madras
SHRI C. SIVARAMAN	J. K. Synthetics Ltd, Bombay
SHRI S. K. IYENGAR (<i>Alternate</i>)	

(Continued on page 2)

© Copyright 1982

BUREAU OF INDIAN STANDARDS

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(Continued from page 1)

Members

SHRI B. G. V. SUBRAMANYAM

SHRI M. G. THANAWALA

SHRI P. G. THANAWALA (*Alternate*)

SHRI S. B. TODI

SHRI N. B. TODI (*Alternate*)

WG CDR S. N. WADHWA

SHRI R. B. MOHINDRA (*Alternate*)

SHRI K. N. M. YELAHANKA

SHRI S. M. CHAKRABORTY,

Director (Tex)

Representing

Indian Space Research Organisation, Ahmadabad

M. Best Cotton Rope Mfg Co, Bombay

Todi Industries Pvt Ltd, Bombay

Ministry of Defence [Air HQ (Maintenance)],
New Delhi

Air India, Bombay

Director General, ISI (*Ex-officio Member*)

Secretary

SHRI A. R. BANERJEE

Deputy Director (Tex), ISI

Indian Standard
SPECIFICATION FOR
TAPE, NYLON, TUBULAR FOR AEROSPACE
APPLICATIONS
(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 30 November 1981, after the draft finalized by the Textile Materials for Aerospace Purposes Sectional Committee had been approved by the Textile Division Council.

0.2 This standard is based on IND/ADE/0068 Tape Nylon Tubular 2.54 cm (1 364 kg), undyed and IND/ADE/0061 Tape Nylon Tubular 2.54 cm (240 kg), undyed, issued by the Ministry of Defence, Government of India.

0.3 The present revision of this standard has been taken up to align it with IS : 9267-1979*.

0.4 Standard of Weights and Measures Act, 1976 stipulates the use of International System of Units in the country; in order to familiarize the industry with this system, the recommended SI units for use in the textile are given in Appendix A.

0.5 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 : 2-1960†. The significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

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

*Specification for nylon tubular webbing for aerospace purposes.

†Rules for rounding off numerical values (revised).

2. MATERIALS

2.1 The following high tenacity nylon yarns made out of nylon 66 or nylon 6 may be used in the manufacture of nylon tubular tape:

<i>Count</i>	<i>Tenacity</i>
23·3 tex (210 d)	54 g/tex (6g/d)
93·3 tex (840 d)	72 g/tex (8g/d)
186·6 tex (1 680 d)	72 g/tex (8g/d)

2.2 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.

2.3 The twist in the final ply shall not be less than 100 *t* pm when tested as given in IS : 832-1964*.

NOTE — In order to ascertain whether nylon 66 or 6 is used the method of test for the determination of melting point as per IS : 5762-1970† may be followed.

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

2.5 The number of plies in the yarn shall be as follows:

<i>Type</i>	<i>Warp</i>	<i>Weft</i>
Type I	8 or 2 or 1	4 or 1
Type II	2 or 1	5 or any No. of ply, the resultant tex (denier) should be 76·5 tex (1 050 d)

3. REQUIREMENTS

3.1 The finished nylon tape shall meet the requirements given in Table 1.

3.2 **Residual Shrinkage** — The residual shrinkage of the nylon tubular tape shall not exceed 2·0 percent when tested in accordance with IS : 2977-1964‡.

*Method for determination of twist in yarn.

†Methods for determination of melting point and melting range.

‡Method for determination of dimensional changes of woven fabrics (other than wool) on soaking in water.

TABLE 1 REQUIREMENTS FOR TAPE, NYLON, TUBULAR FOR AEROSPACE APPLICATIONS

Sl. No.	CHARACTERISTIC	REQUIREMENT FOR		METHOD OF TEST, REF TO
		Type I	Type II	
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 : 1954-1969*
ii)	Width, mm Tolerance in mm		25 + 2 - 0	
iii)	Thickness, mm, <i>Max</i> under a pressure of 2 N	2.3	1.5	IS : 7702-1975†
iv)	Ends in full width, <i>Min</i>	160	206	IS : 1963-1969‡
v)	Picks/dm Tolerance	100 + 2	170 + 4	
vi)	Mass, g/m, <i>Max</i>	39	12	IS : 1964-1970§
vii)	Breaking load in full width × 20 cm between grips, N, <i>Min</i>	13 377	2 352	IS : 1969-1968
viii)	Elongation at break, <i>Min</i>	16 percent		
ix)	Weave	Tubular, Plain 1/1		

NOTE 1 — Prior to cutting test specimens for mass (g/m^2) test, the nylon tubular tape shall be subjected to a tension equal to its one percent specified minimum breaking load for 60 ± 5 seconds on a breaking load testing machine.

NOTE 2 — 1N = 0.102 kgf.

*Methods for determination of length and width of fabrics (*first revision*).

†Methods for determination of thickness of woven and knitted fabrics.

‡Methods for determination of threads per decimetre in woven fabrics (*first revision*).

§Methods for determination of weight per square metre and weight per linear metre of fabrics (*first revision*).

||Method for determination of breaking load and elongation at break of woven textile fabrics (*first revision*).

3.3 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 Appendix D of IS : 4727-1968*.

3.4 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 $180 \pm 3^{\circ}\text{C}$ and subsequently conditioned as given in IS : 6359-1971†.

3.5 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.

4. PACKING

4.1 The tubular nylon tape rolls arranged in cylindrical form shall be tied with a 3-ply jute twine (see IS : 1912-1975‡) to form a pack, such packs, after being wrapped in 40 μm thick polyethylene film (see IS : 2508-1977§), shall be packed in wooden crates lined with water proof packing paper (see IS : 1398-1968||). The gross mass of the package shall not exceed 40 kg.

5. MARKING

5.1 Each roll shall provide the following information on a label attached to it.

- a) Length (m), width (mm) and thickness (mm);
- b) 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.

*Specification for nylon webbing for aeronautical purposes.

†Method for conditioning of textiles.

‡Specification for country jute twine (*first revision*).

§Specification for low density polyethylene films (*first revision*).

||Specification for packing paper, waterproof, bitumen-laminated (*first revision*).

5.1.1 The product may also be marked with Standard mark.

5.1.2 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6. SAMPLING

6.1 The sampling, inspection and testing scheme shall be detailed in the contract or order till the publishing of the 'Indian Standard on Sampling inspection and testing scheme for aerospace textile material' (*under preparation*).

NOTE— For selection of suitable single, double or multiple sampling plan, IS : 2500 (Part I)-1973* may be consulted.

APPENDIX A

(Clause 0.4)

RECOMMENDED SI UNITS FOR TEXTILES

SI No.	Characteristic	SI Unit		Application
		Unit	Abbreviation	
(1)	(2)	(3)	(4)	(5)
1.	Length	Millimetre	mm	Fibres
		Millimetre, centimetre	mm, cm	Samples, test specimens (as appropriate)
		Metre	m	Yarns, ropes, cordage, fab- rics

*Sampling inspection tables: Part I Inspection by attributes and by count of defects (first revision).

SI No.	Characteristic	SI Unit		Application
		Unit	Abbreviation	
(1)	(2)	(3)	(4)	(5)
2.	Width	Millimetre	mm	Narrow fabrics
		Centimetre	cm	Other fabrics
		Millimetre,	mm, cm	Samples, test
		centimetre		specimens (as appropriate)
				Carpets, druggets, <i>DURRIES</i> (as appropriate)
3.	Thickness	Micrometre (micron)	μ m	Delicate fabrics
		Millimetre	mm	Other fabrics, carpets, felts
4.	Linear density	Tex	tex	Yarns
		Millitex	mtex	Fibres
		Decitex	dtex	Filaments, filament yarns
		Kilotex	ktex	Slivers, ropes, cordage
5.	Diameter	Micrometre (micron)	μ m	Fibres
		Millimetre	mm	Yarns, ropes, cordage
6.	Circumference	Millimetre	mm	Ropes, cordage
7.	Threads in fabric			Woven fabrics (as appropriate)
a)	Lengthwise	Number per centimetre	ends/cm	
		Number per decimetre	ends/dm	
b)	Widthwise	Number per centimetre	picks/cm	
		Number per decimetre	picks/dm	

Sl No.	Characteristic	SI Unit		Application
		Unit	Abbreviation	
(1)	(2)	(3)	(4)	(5)
8.	Warp threads in loom	Number per centimetre	ends/cm	Reeds
9.	Stitches in knitted fabric			Knitted fabrics (as appropriate)
	a) Lengthwise	Courses per centimetre Courses per decimetre	courses/cm courses/dm	
	b) Widthwise	Wales per centimetre Wales per decimetre	wales/cm wales/dm	
10.	Stitch length	Millimetre	mm	Knitted fabrics, made-up items
11.	Mass per unit area	Grams per square metre	g/m ²	Fabrics
12.	Mass per unit length	Grams per metre	g/m	Fabrics
13.	Twist	Turns per centimetre Turns per metre	turns/cm turns/m	Yarns, ropes, cordage (as appropriate)
14.	Test or gauge length	Millimetre, centimetre	mm, cm	Fibre, yarn and fabric specimens (as appropriate)
15.	Breaking load	Millinewton	mN	Fibres, delicate yarns (individual or skeins)
		Newton	N	Strong yarns (individual or skeins), ropes, cordage, fabrics

IS : 6349 - 1981

<i>Sl No.</i>	<i>Characteristic</i>	<i>Sl Unit</i>		<i>Application</i>
		Unit	Abbreviation	
(1)	(2)	(3)	(4)	(5)
16.	Breaking length	Kilometre	km	Yarns
17.	Tenacity	Millinewton per tex	mN/tex	Fibres, yarns (individual or skeins)
18.	Twist factor or twist multiplier	Turns per centimetre \times square root of tex	turns/cm $\times \sqrt{\text{tex}}$	Yarns (as appropriate)
		Turns per metre \times square root of tex	turns/m $\times \sqrt{\text{tex}}$	
19.	Bursting strength	Newton per square centimetre	N/cm ²	Fabrics
20.	Tear strength	Millinewton, newton	mN, N	Fabrics (as appropriate)
21.	Pile height	Millimetre	mm	Carpets
22.	Pile density	Mass of pile yarn in grams per square metre per millimetre pile height	g/m ² /mm pile height	Pile carpets
23.	Elastic modulus	Millinewton per tex per unit deformation	mN/tex/unit deformation	Fibres, yarns, strands

BUREAU OF INDIAN STANDARDS

Headquarters.

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002
Telephones 23230131, 23233375, 23239402 **Fax** 91+011 23239399, 23239382
Mail info@bis.org.in **website** http://www.bis.org.in

Central Laboratory:

Plot No 20/9, Site IV, Sahibabad Industrial Area, SAHIBABAD 201010

Telephone

277 0032

Regional Offices:

Central Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002	2323 7617
Eastern 1/14 CIT Scheme VII M, V I P Road, Kankurgachi, KOLKATA 700054	2337 8662
Western SCO 335-336, Sector 34-A, CHANDIGARH 160022	260 3843
Southern C I T Campus, IV Cross Road, CHENNAI 600113	2254 1984
Western Manakalaya, E9, MIDC, Behind Marol Telephone Exchange, Andheri (East), MUMBAI 400093	2832 9295

Branch Offices:

Dushpak', Nurmohamed Shaikh Marg, Khanpur, AHMEDABAD 380001	560 1348
Benya Industrial Area, 1 st Stage, Bangalore-Tumkur Road BANGALORE	839 4955
Commercial-cum-Office Complex, Opp Dushera Maidan, F-5 Arera Colony, Bittan Market, BHOPAL 462016	242 3452
63, Ganga Nagar, Unit VI, BHUBANESHWAR 751001	240 3139
Floor, Koval Towers, 44 Bala Sundaram Road, COIMBATORE 641018	221 0141
DO 21, Sector 12, Faridabad 121007	229 2175
Avitri Complex, 116 G T Road, GHAZIABAD 201001	286 1498
1/5 Ward No 29, R G Barua Road, 5th By lane, Apurba Sinha Path, GUWAHATI 781003	245 6508
8-56C, L N Gupta Marg, Nampally Station Road, HYDERABAD 500001	2320 1084
52, Chitaranjan Marg, C-Scheme, JAIPUR 302001	237 3879
7/418 B, Sarvodaya Nagar, KANPUR 208005	223 3012
Pathi Bhawan, 2 nd Floor, Behind Leela Cinema, Naval Kishore Road, LUCKNOW 226001	261 8923
T Building, Second Floor, Gokulpat Market, NAGPUR 440010	252 5171
Manabir Bhavan, 1 st Floor, Ropar Road, NALAGARH 174101	22 1451
Plot No A-20-21, Institutional Area, Sector 62, Goutam Budh Nagar, NOIDA-201307	240 2206
Atliputra Industrial Estate, PATNA 800013	226 2808
1 st Floor, Plot Nos 657-660, Market Yard, Gultkdi, PUNE 411037	426 8659
Manahanand House* 3 rd Floor, Bhaktinagar Circle, 80 Feet Road, RAJKOT 360002	237 8251
C No 14/1421, University PO Palayam, THIRUVANANTHAPURAM 695034	233 9174
1 st Floor, Udyog Bhavan, VUDA, Siripuram Junction, VISHAKHAPATNAM-03	271 2833
Sales Office is at 5 Chowringhee Approach, P.O Princep Street, KOLKATA 700072	2355 3243
Sales Office is at Novelty Chambers, Grant Road, MUMBAI 400007	2309 6528

Printed at Sita Fine Arts (P) Ltd ,

BUREAU OF INDIAN STANDARDS

Headquarters.

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones 23230131, 23233375, 23239402 Fax 91+011 23239399, 23239382

E-Mail info@bis.org.in website http://www.bis.org.in

Central Laboratory:

Plot No 20/9, Site IV, Sahibabad Industrial Area, SAHIBABAD 201010

Telephone

277 0032

Regional Offices:

Central Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

2323 7617

*Eastern 1/14 CIT Scheme VII M, V I P Road, Kankurgachi, KOLKATA 700054

2337 8662

Northern SCO 335 336, Sector 34-A, CHANDIGARH 160022

260 3843

Southern C I T Campus, IV Cross Road, CHENNAI 600113

2254 1984

Western Manakalaya, E9, MIDC, Behind Marol Telephone Exchange,
Andheri (East), MUMBAI 400093

2832 9295

Branch Offices:

'Pushpak' Nurmohamed Shaikh Marg, Khanpur, AHMEDABAD 380001

560 1348

Peenya Industrial Area, 1st Stage, Bangalore Tumkur Road, BANGALORE

839 4955

Commercial-cum-Office Complex, Opp Dushera Maidan, E 5 Arera Colony,
Bittan Market, BHOPAL 462016

242 3452

62 63, Ganga Nagar, Unit VI, BHUBANESHWAR 751001

240 3139

5th Floor, Kovai Towers, 44 Bala Sundaram Road, COIMBATORE 641018

221 0141

SCO 21, Sector 12, Faridabad 121007

229 2175

Savitri Complex, 116 G T Road, GHAZIABAD 201001

286 1498

53/5 Ward No 29, R G Barua Road, 5th By lane, Apurba Sinha Path,
GUWAHATI 781003

245 6508

5-8-56C L N Gupta Marg, Nampally Station Road, HYDERABAD 500001

2320 1084

E-52, Chitaranjan Marg, C-Scheme, JAIPUR 302001

237 3879

117/418 B, Sarvodaya Nagar, KANPUR 208005

223 3012

Sethi Bhawan 2nd Floor, Behind Leela Cinema, Naval Kishore Road,
LUCKNOW 226001

261 8923

NIT Building, Second Floor, Gokulpat Market, NAGPUR 440010

252 5171

Mahabir Bhavan, 1st Floor, Ropar Road, NALAGARH 174101

22 1451

Plot No A-20-21, Institutional Area, Sector 62, Goutam Budh Nagar, NOIDA-201307

240 2206

Patliputra Industrial Estate, PATNA 800013

226 2808

First Floor, Plot Nos 657-660, Market Yard, Gultkdi, PUNE 411037

426 8659

'Sahajanand House' 3rd Floor, Bhaktinagar Circle, 80 Feet Road,
RAJKOT 360002

237 8251

T C No 14/1421, University PO Palayam, THIRUVANANTHAPURAM 695034

233 9174

1st Floor, Udyog Bhavan, VUDA, Siripuram Junction, VISHAKHAPATNAM-03

271 2833

*Sales Office is at 5 Chowringhee Approach, PO Princep Street, KOLKATA 700072

2355 3243

*Sales Office is at Novelty Chambers, Grant Road, MUMBAI 400007

2309 6528

Printed at Sita Fine Arts (P) Ltd ,