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भारतीय मानक
वस्त्रादि — वायु आकाशीय कार्यों के लिए सिलाई
करने के नायलोन के धागे — विशिष्टि
(दूसरा पुनरीक्षण)

Indian Standard
TEXTILES NYLON SEWING THREADS FOR
AEROSPACE PURPOSES SPECIFICATION
(Second Revision)

(Incorporating Amendment No. 1)

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Price Group 3

FOREWORD

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

This Indian Standard, first published in 1967 and subsequently revised in 1978, was based on IND/ADE/0063 Thread, sewing, nylon, undyed/dyed issued by the Ministry of Defence, Government of India. It has been revised again on the basis of experience gained during its use. The major changes carried out in this revision are as follows:

- a) The requirement for minimum length of sewing thread per unit mass has been included.
- b) The tolerances on twist levels have been specified.
- c) The values of breaking strength and extension at break have been amended in the light of experience gained in the past.
- d) Nominal count of yarn used in the sewing threads have been specified as commonly used in industry.
- e) The condition of material, in which thread shall be supplied, has been specified.
- f) The relaxation with respect to breaking strength, extension at break and length per unit mass for the dyed threads has been included.

This edition 3.1 incorporates Amendment No. 1 (April 1998). Side bar indicates modification of the text as the result of incorporation of the amendment.

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 Rules for rounding off numerical values (revised). 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 NYLON SEWING THREADS FOR AEROSPACE PURPOSES SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This standard prescribes the constructional particulars and performance requirements for 6 varieties of nylon sewing threads used for stitching aerospace textile materials.

2 REFERENCES

2.1 The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 YARN

Bright, high tenacity, continuous multifilament yarn of nylon 6 or nylon 6.6 shall be used in the manufacture of sewing thread. The yarn shall be even and uniform with suitable twist to produce a balanced thread.

4 FINISH

4.1 General

The threads shall be supplied heat set and in one of the following conditions according to the agreement between the buyer and the seller:

- a) Undyed,
- b) Undyed and bonded,
- c) Dyed, or
- d) Dyed and bonded.

4.2 A lubricating finish may be applied to the thread to facilitate its performance.

4.3 Finishing and bonding agents shall not contain substances known to promote microbiological growth.

4.4 Dyeing

If dyeing is required, the colour and depth of shade shall be as specified in contract or order. For dyeing, metallic or chrome dyes shall not be used. The dyeing should be uniform throughout and dyed threads should be free from dyeing defects.

5 REQUIREMENTS

5.1 The nylon sewing threads shall conform to the requirements specified in Table 1 and Table 2.

5.2 Twist

Threads shall be supplied with suitable twist levels as agreed to between the buyer and the seller so as to meet the requirements given in Table 1. The twist shall not vary more than 10 percent for any level of twist.

5.2.1 The direction of twist in single yarn and final thread shall be at the discretion of the manufacturer. However, the direction of twist starting from single yarn should be S/ for plied and S/S/ for cabled threads.

5.2.2 The amount of twist shall be tested in accordance with IS 832 : 1985.

5.3 Extension Under Load

The extension of the threads, when subjected to a load equal to 25 percent of the specified strength for 60 seconds, shall not exceed 15 percent.

5.4 Shrinkage in Boiling Water

The mean shrinkage of the threads in boiling water, when determined in accordance with the method prescribed in IS 4910 (Part 5) : 1989, shall not exceed 2.5 percent.

5.5 Sewing Properties

5.5.1 Threads of minimum length per unit mass of not less than 9 000 m/kg shall be tested in accordance with Annex B. The stitching pattern shall be completed without slipped or broken stitches and the number of malformed stitches shall not exceed two.

5.5.2 Threads other than those specified in 5.5.1 shall be tested in accordance with Annex C. The stitching pattern shall be completed without slipped or broken stitches and the number of malformed stitches shall not exceed two.

6 SEALED SAMPLE

6.1 If, in order to specify the shade, tone, finish, and general appearance, etc, a sample has been agreed upon between the buyer and the seller and sealed, the supply shall be in conformity with the sealed sample in such respects.

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

Table 1 Physical Requirements
(Clauses 5.1 and 5.2)

Variety No.	Structure of Sewing Thread		Length per Unit Mass, Min, m/kg (see Note 1)	Average Breaking Strength Min, N (see Notes 1 and 2)	Average Extension at Break, Max, Percent (see Note 1)
	Filament Yarn Linear Density Tex	No. of Plies			
L1	23	2	18 500	23.5	28
L2	23	3	12 300	35.0	28
H1	23	6 (2 3)	6 150	71.0	28
H2	23	9 (3 3)	4 100	106.0	28
H3	23	12 (4 3)	3 075	141.0	28
H4	23	18 (6 3)	2 050	211.0	28
Method of Test	IS 4910 (Part 2) : 1989		IS 4910 (Part 3) : 1989		

NOTES

1 In case of dyed threads, 5 percent relaxation shall be allowed in length per unit mass, breaking strength and extension at break.

2 No individual reading of breaking strength shall be less than 95 percent of the specified value.

Table 2 Chemical Requirements
(Clause 5.1)

Sl No.	Characteristic	Requirement	Method of Test
i)	Colour fastness to:		
	a) Light	5 or better	IS 2454 : 1985
	b) Washing, Test 2 (Change in colour and staining of adjacent fabrics)	4 or better	IS 3361 : 1979
	c) Dry-cleaning	4 or better	IS 4802 : 1988
ii)	Conductivity of aqueous extract (see Notes 1 and 2), Max	150 S/cm	IS 4420 : 1967
iii)	pH value of aqueous extract	6 to 8	IS 1390 : 1983 (Cold method)
iv)	Water soluble chlorides, as NaCl, Max	0.1 percent	IS 4202 : 1967
v)	Water soluble sulphates, as Na ₂ SO ₄ , Max	0.25 percent	IS 4203 : 1967

NOTES

1 Test for pH value, water soluble chlorides and sulphates to be carried out only when the conductivity exceeds the specified value.

2 The nylon sewing thread failing in respect of conductivity shall be retested if it fails also in respect of pH, water soluble chlorides or water soluble sulphates.

7 PACKAGING

7.1 The nylon sewing threads shall be compactly wound on reels or bobbins or in any other form and supplied as detailed in the contract or order. The free end of the thread shall be securely fastened to prevent unravelling.

8 MARKING

8.1 Each package shall be marked, preferably by a label, with the following information:

a) Name of the material,

b) Variety No. (see Table 1),

c) Nominal length or mass of thread in metres in a unit package,

d) Year of manufacture, and

e) Indication of the source of manufacture.

8.1.1 Each package may also be marked with the Standard Mark.

9 PACKING

9.1 Unless otherwise specified, the package containing the nylon sewing thread shall be packed in accordance with IS 1066 : 1980.

10 SAMPLING AND CRITERIA FOR CONFORMITY**10.1 Lot**

The quantity of sewing thread of same quality and variety delivered to a buyer against one despatch note shall constitute a lot.

10.2 The conformity of the lot to the requirements of this standard shall be determined on the basis of tests carried out on the sample selected from it. Unless otherwise agreed to between the buyer and the seller, the number of packages to be selected from a lot shall be according to Table 3. To ensure randomness of selection, methods given in IS 4905 : 1968 shall be followed.

Table 3 Sample Size and Permissible Number of Non-conforming Packages
(Clauses 10.2 and 10.3)

Lot Size	Sample Size	Permissible Number of Non-conforming Packages
Up to 100	5	0
101 to 300	10	0
301 to 500	15	0
501 to 1 000	20	1
1 001 and above	30	1

10.3 The sample size and criteria for conformity for various characteristics shall be as follows:

Characteristics	Samples Size	Criteria for Conformity
a) Breaking strength, elongation at break, length (m/kg), twist per metre, extension under specified load and mass and length of sewing thread	All the packages according to col 2 of Table 3	Non-conforming packages not to exceed corresponding number given in col 3 of Table 3
b) Colour fastness, conductivity of aqueous extract, pH value of aqueous extract, water soluble chlorides, water soluble sulphates, shrinkage in boiling water and sewing properties	Two packages for a lot of 300 packages and three above 300	All the packages to satisfy the relevant requirements

ANNEX A

(Clause 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	Title	IS No.	Title
832 : 1985	Methods for determination of twist in yarn (first revision)	4727 : 1968	Nylon webbing for aeronautical purposes
1066 : 1980	Code for packaging of sewing threads (first revision)	4802 : 1988	Method for determination of colour fastness of textile materials to dry-cleaning (first revision)
1390 : 1980	Methods for determination of pH value of aqueous extracts of textile materials (first revision)	4905 : 1968	Methods for random sampling
2454 : 1985	Methods for determination of colour fastness of textile materials to artificial light (xenon lamp) (first revision)	4910 (Part 2) : 1989	Methods of test for tyre yarns, cords and tyre cord warp-sheets made from man-made fibres: Part 2 Linear density (first revision)
3361 : 1979	Method for determination of colour fastness of textile materials to washing: Test 2 (first revision)	4910 (Part 3) : 1989	Methods of test for tyre yarns, cords and tyre cord warp-sheets made from man-made fibres: Part 3 Breaking load, elongation at break and tenacity (first revision)
4202 : 1967	Method for determination of chloride content in textile materials	4910 (Part 5) : 1989	Methods of test for tyre yarns, cords and tyre cord warp-sheets made from man-made fibres: Part 5 Heat shrinkage and heat shrinkage force (first revision)
4203 : 1967	Method for determination of sulphate content in textile materials		
4420 : 1967	Methods for determination of conductivity of aqueous and organic extracts of textile materials		

ANNEX B

(Clause 5.5.1)

TEST FOR SEWING PROPERTIES FOR THREADS OF LINEAR DENSITY ABOVE 9 000 METRES PER KILOGRAM

B-1 GENERAL

The properties of the fabric on which this test is to be performed shall be according to the agreement between the buyer and the seller.

stitches per minute, maintaining 32 stitches/dm, properly adusted for tension, 8 mm gauge, and fitted with an appropriate size of needle, shall be used.

B-2 TEST SPECIMEN

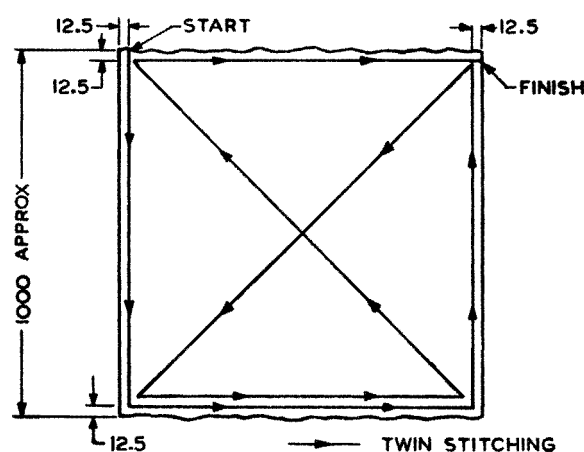
The test specimen shall consist of four full-width lengths, each approximately 1 m long, of nylon parachute fabric laid out in stack.

B-4 PROCEDURE

Stitch the test piece at the rate given in B-2 as shown in Fig. 1 lifting the foot and needle but not cutting the thread at the end of each straight run to enable the test piece to be turned. Ignore any slight looping at each corner.

B-3 APPARATUS

**A twin-needled lockstitch sewing machine
capable of stitching at the rate of 3 250 250**



All dimensions in millimetres.

FIG. 1 TEST PIECE FOR LIGHT SEWING THREADS

ANNEX C

(Clause 5.5.2)

TEST FOR SEWING PROPERTIES FOR THREADS OF LINEAR DENSITY LESS THAN 9 000 METRES PER KILOGRAM**C-1 TEST SPECIMEN**

Four test specimens of dyed nylon webbing conforming to IS 4727 : 1968 shall be tested. Each specimen shall consist of the layers of webbing, approximately 45 mm wide and 0.5 m long as given below:

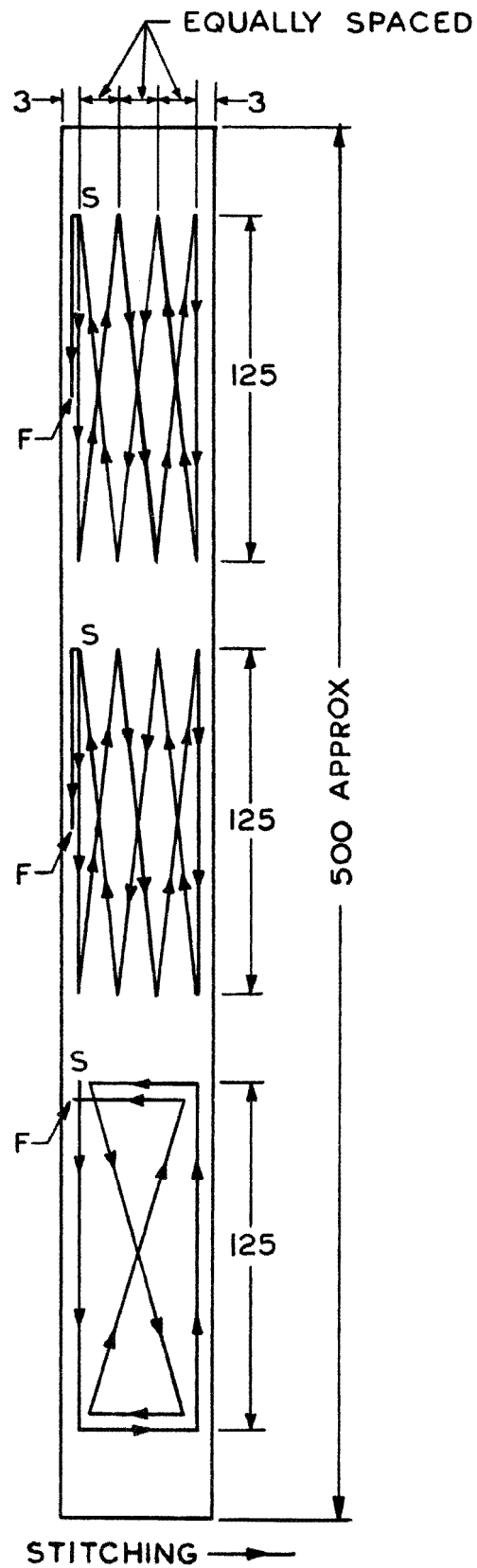
- | | |
|--|----------|
| a) For threads of varieties
No. H1 and H2 | 2 layers |
| b) For threads of varieties
No. H3 and H4 | 3 layers |

C-2 APPARATUS

A single-needle lockstitch sewing machine, capable of stitching at the rate of 250 40 stitches per minute, maintaining 20 stitches/dm, properly adusted for tension and fitted with an appropriate size of needle shall be used. Application of lubricant to the needle is permitted.

C-3 PROCEDURE

Stitch together the webbings of each test piece with two four point double Ws and a gate pattern, as shown in Fig. 2.



All dimensions in millimetres.

FIG. 2 TEST PIECE FOR HEAVY SEWING THREADS

Standard Mark

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Amendments Issued Since Publication

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