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(तीसरा पुनरीक्षण)
Indian Standard

TEXTILES — COTTON SEWING THREADS FOR
AEROSPACE PURPOSES — SPECIFICATION
(*Third Revision*)

ICS 59.080.20



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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard (Third 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 standard was first published in 1959 and subsequently revised in 1963 and 1979. This standard has been revised again to incorporate the following:

- a) Requirements of rot-proofing, moisture content, pH value of aqueous extract, water soluble chlorides, water soluble sulphates, water soluble matter and ash content; and
- b) Conditions, namely, scoured, dyed, bleached, etc, in which sewing thread is to be supplied.

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 — COTTON SEWING THREADS FOR AEROSPACE PURPOSES — SPECIFICATION

(Third Revision)

1 SCOPE

This standard specifies constructional particulars and other requirements for fifteen varieties of cotton sewing threads used for aerospace purposes.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard :

IS No.	Title
199 : 1989	Textiles — Estimation of moisture, total size or finish, ash and fatty matter in grey and finished cotton textile materials (<i>third revision</i>)
765 : 1979	Method for determination of colour fastness of textile materials to washing, Test 4 (<i>second revision</i>)
1039 : 1989	Textiles — Estimation of copper, iron, manganese, chromium and zinc (<i>first revision</i>)
1066 : 1980	Code for packing of sewing threads (<i>first revision</i>)
1315 : 1977	Method for determination of linear density of yarn spun on cotton system (<i>first revision</i>)
1390 : 1983	Methods for determination of pH value of aqueous extracts of textile materials (<i>first revision</i>)
1670 : 1991	Textiles — Yarn — Determination of breaking load and elongation at break of single strand (<i>second revision</i>)
2454 : 1985	Methods for determination of colour fastness of textile materials to artificial light (Xenon lamp) (<i>first revision</i>)
3456 : 1966	Method for determination of water soluble matter of textile materials
3522 (Part 1) : 1989	Methods for estimation of common preservatives used on textiles, Part 1 (<i>first revision</i>)
4202 : 1967	Method for determination of chloride content of textile materials
4203 : 1967	Method for determination of sulphate content in textile materials
4655 : 1968	Method for determination of iron and chromium in textiles

3 MANUFACTURE

The sewing thread shall be manufactured from evenly spun cotton yarn. The thread shall be uniform and free from spinning and doubling defects.

4 FINISH

4.1 General

The thread shall be supplied in one of the following conditions, as stipulated in contract or order:

- a) Scoured;
- b) Scoured and dyed/bleached;
- c) Scoured and rot-proofed; and
- d) Scoured, dyed/bleached and rot-proofed.

4.2 Dyeing

In case of dyed threads, the shade and colour shall be as stated in contract or order. However, the sulphur dyes shall not be used.

4.3 Rot-Proofing

If required by the buyer, the thread shall be rot-proofed by any one of the processes as given in Table 1 and shall meet the requirements specified therein.

Table 1 Requirements for Rot-Proofing

Sl No. (1)	Proofing Process and Its Characteristic (2)	Requirement (3)	Method of Test (4)
i)	Salicylanilide Process Salicylanilide content, percent by mass, <i>Min</i>	0.1	IS 3522 (Part 1)
ii)	Copper Cutch Process Copper content calculated as copper, percent by mass, <i>Min</i>	0.7	IS 1039
iii)	Chrome-Copper Process: a) Chromium content, calculated as chromium, percent b) Copper content calculated as copper, percent by mass, <i>Min</i>	0.5-1.5 0.2	IS 1039 IS 1039
iv)	Chromium Process Chromium content calculated as chromium, percent by mass	0.7-1.0	IS 1039
v)	Chromium and Iron Process Chromium-iron content together, percent by mass, <i>Min</i>	1.5	IS 4655

4.4 Surface Finish

The thread shall have a soft finish. Substances which may promote microbial growth (for example, starch or modified starch) shall not be used.

4.4.1 The thread may also be mercerized or polished; if required by the buyer.

5 REQUIREMENTS

5.1 The sewing threads shall conform to the constructional requirements specified in Table 2.

5.2 Length

The length of the sewing thread in each package shall not be less than that specified in contract or order, or declared on package.

5.3 Performance

The sewing threads when subjected to the test specified in 5.3.1 and 5.3.2, shall complete the test without slipped or broken stitches. The number of malformed stitches shall not exceed two for each test specimen.

5.3.1 A representative sample of sewing thread shall be used for sewing under identical conditions (for example, fabric, type of seam, tensions, stitches per decimetre, speed, type of stitch, type of needle, needle size and length of stitching) which are to be employed in the manufacture of items for which thread is intended to be used. The number of tests, test specimen

and length of stitching shall be as specified in the contract or order.

5.3.2 A representative sample of sewing thread shall be used for sewing 2 000 stitches into four thicknesses of fabric on a sewing machine, using needle and tension appropriate for the size of thread being tested. The number of tests and test specimens shall be as specified in the contract or order.

5.4 Balance of Twist

Not more than 5 turns shall be permitted as re-twist or double on account of kink in the loop when the two ends of thread gripped by hand approximately 1.5 in apart, are brought together.

5.5 In addition the sewing threads shall also conform to the chemical requirements given in Table 3.

5.5.1 Effectiveness of Proofing Against Mildew

The material shall remain completely unaffected when tested by the method given in Annex A.

6 PACKAGING

Sewing thread shall be compactly wound in the form of tubes, reels, cones or in any other form as may be required. In the case of polished threads wound on parallel tubes or tapered cones and the other sewing threads wound on reels (whether wooden or plastic), the free end of the thread shall be securely fastened to prevent unravelling.

Table 2 Constructional Requirements of Sewing Threads
(Clause 5.1)

Variety No.	Nominal Universal Count in Decitex (Cotton Count)	Construction	Linear Density, Max	Breaking Load on 50 cm Test Length of Finished Thread, Min
(1)	(2)	(3)	(4)	(5)
1	59 dtex $\times$ 3(100 s/3)	3-Ply	19 g/km	4.4(0.45) N (kgf)
2	210 dtex $\times$ 2(28 s/2)	2-Ply	46	8.8(0.90)
3	120 dtex $\times$ 4(50 s/4)	4(2 $\times$ 2) cord	53	9.8(1.0)
4	100 dtex $\times$ 6(60 s/6)	6(2 $\times$ 3) cord	66	13.7(1.4)
5	185 dtex $\times$ 4(32 s/4)	4(2 $\times$ 2) cord	85	16.7(1.7)
6	165 dtex $\times$ 6(36 s/6)	6(2 $\times$ 3) cord	110	22.6(2.3)
7	120 dtex $\times$ 9(50 s/9)	9(3 $\times$ 3) cord	121	25.5(2.6)
8	590 dtex $\times$ 3(10 s/3)	3-Ply	187	40.0(4.1)
9	250 dtex $\times$ 9(24 s/9)	9(3 $\times$ 3) cord	247	49.0(5.0)
10	270 dtex $\times$ 9(22 s/9)	9(3 $\times$ 3) cord	253	58.0(5.9)
11	1 000 dtex $\times$ 3(6 s/3)	3-Ply	310	69.0(7.0)
12	1 000 dtex $\times$ 4(6 s/4)	4-Ply	406	98.0(10.0)
13	165 dtex $\times$ 27(36 s/27)	27(9 $\times$ 3) cord	495	98.0(10.0)
14	1 000 dtex $\times$ 5(6 s/5)	5-Ply	562	113.0(11.5)
15	1 000 dtex $\times$ 8 (6 s/8)	8-Ply	910	165.0(16.8)
Methods of Test	—	—	IS 1315	IS 1670

NOTE — Unless otherwise specified, direction of final twist shall be 'Z'.

Table 3 Chemical Requirements
(Clause 5.5)

Sl No.	Characteristic	Requirement	Test Method
(1)	(2)	(3)	(4)
i)	Moisture, percent by mass, <i>Max</i>	8.5	IS 199
ii)	pH of aqueous extract	5.5-7.5	IS 1390 (Cold Method) IS 3456
iii)	Matter soluble in water, percent by mass, <i>Max</i>		
	a) Unproofed material	0.5	
	b) Proofed material	1.5	
iv)	Water soluble chlorides calculated as sodium chloride, percent by mass, <i>Max</i>		IS 4202
v)	Water soluble sulphates calculated as sodium sulphates, percent by mass, <i>Max</i>	0.05	IS 4203
vi)	Ash on incineration in excess of ash due to proofing agents, percent by mass, <i>Max</i>	0.25	IS 199
vii)	Colour fastness to:		
	a) Light	5 or better	IS 2454
	b) Washing: Test 4	4 or better	IS 765

7 MARKING

7.1 Each package shall be suitably marked with the following information :

- Name and variety number;
- Length of sewing thread in the package (m);
- Condition (see 4.1);
- Year of manufacture; and
- Manufacturer's name/trade-mark.

7.1.1 BIS Certification Marking

Each package may also be marked with the Standard Mark.

7.1.2 The use of the Standard Mark is governed by the provisions of *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.

8 PACKING

Unless otherwise specified in the contract or order, the sewing thread shall be packed in accordance with IS 1066.

9 SAMPLING

9.1 Lot

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

9.2 The conformity of a lot to the requirements of the standard shall be determined on the basis of the

tests carried out on the samples selected from the lot.

9.3 Unless otherwise agreed to between the buyer and the seller, the number of packs to be selected at random from the lot shall be in accordance with col 2 of Table 4.

Table 4 Sampling
(Clause 9.3)

Number of Packs in the Lot	Number of Packs to be Selected
(1)	(2)
Up to 150	3
151 " 300	5
301 " 500	7
501 " 1 000	10

9.4 The cone, reel or tube selected according to 9.3 shall constitute the test sample for all requirements except colour fastness. One test specimen shall be selected from each pack selected for carrying out the tests.

9.5 The number of test specimens to be selected at random for testing colour fastness from test sample shall be 3.

10 CRITERIA FOR CONFORMITY

10.1 The lot shall be considered conforming to the requirements of this standard, if the following conditions are satisfied:

- None of the test specimens is found defective when tested for requirement specified in 5.4.
- None of the test specimens tested for colour fastness shall fail to satisfy the corresponding requirements.
- From the results in respect of any of the requirements, namely, count, linear density, breaking load, rot-proofing, pH value of aqueous extract, moisture content, chloride content, sulphate content, ash content and water soluble matter the average ($\bar{x}$) and the range (R) or the mean range ($\bar{R}$) shall be calculated and the applicable condition(s) from amongst those given below is/are satisfied:
 - The value of the expression $\bar{x} + k\bar{R}$ or $\bar{x} + kR$ is less than or equal to the upper specification limit (U) specified.
 - The value of expression $\bar{x} - k\bar{R}$ or $\bar{x} - kR$ is greater than or equal to L where the lower specification limit (L) specified.
 - If both the upper and lower specification limits are given, the conditions (1) and (2) as well as the following conditions are satisfied:

$$\frac{R}{U-L} \text{ or } \frac{\bar{R}}{U-L} < B$$

NOTES

1 The constants k and B shall be as given below :

No. of Test Results (n)	k	B
Less than 10	0.6	0.8
10 or 15	0.7	0.6

2 Average $\bar{x}$ is the value obtained by dividing the sum of the observed values by the number of tests.

3 Range R is the difference between the maximum and the minimum in a set of observed values.

4 When the number of test results is 10 or 15, they shall be grouped in groups of 5. The mean range $\bar{R}$ is the value obtained by taking the average of the groups.

ANNEX A

(Clause 5.5.1)

EFFECTIVENESS OF PROOFING AGAINST MILDEW

A-1 Five lengths of the treated thread each 1 metre long, shall be taken and tied into small hanks.

A-2 The hanks shall be placed in a petri dish or similar receptacle together with five similar hanks of untreated thread previously boiled for 1/2 hour in distilled water and dried. 10 hanks of thread will then be sprayed with a mixture of spores of the following fungi :

Pencillium (Cownpore Stock culture)	No. 55
Aspergillus fumigatus Stock culture	No. 3

Aspergillus niger Stock culture	No. 4
Chaetomium globosum Stock culture	No. 6
Nemoniella eachinata Stock culture	No. 30
Rhizous sp. Stock culture	No. 20

A-3 After inoculation, the uncovered dish, shall be subjected to a temperature of 25 to 30°C and humidity of 90 percent to 100 percent for 14 days. If after this period the treated thread remains completely unaffected whilst the untreated thread shows growth of fungi, the proofing shall be considered as satisfactory.