BRITISH STANDARD AEROSPACE SERIES

BS 5F 120:2002
(Superseding BS 4F 120:1993)

CONFIRMED
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Continuous filament nylon sewing threads for aerospace purposes

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February 2008

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee ACE/22, Cords, ropes and sewing threads for aerospace purposes, upon which the following bodies were represented:

Linen Sewing Thread Manufacturers Association
Ministry of Defence — UK Defence Standardization
Society of British Aerospace Companies Ltd.

This British Standard, having been prepared under the direction of the Engineering Sector Policy and Strategy Committee, was published under the authority of the Sector Policy and Strategy Committee 11 July 2002

BS F 120: 1964
BS 2F 120: June 1975
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Amendments issued since publication

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The following BSI references relate to work on this British Standard:
Committee reference ACE/22
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Contents

Foreword

This British Standard, prepared under the direction of Technical Committee ACE/22, Cords, ropes and sewing threads for aerospace purposes, is one of a series of standards for textiles of a quality suitable for aerospace purposes.

This British Standard supersedes BS 4F 120:1993 which is withdrawn. This new edition incorporates technical changes but it does not reflect a full review or revision of the standard, which will be undertaken in due course.

The primary difference between the fourth edition and the third edition of this British Standard was the introduction of three alternative constructions for 312, 950 and 1160 dtex yarns to allow the use of modern manufacturing methods to improve freedom from faults.

This new edition incorporates all earlier amendments, updates references to other standards, revises the reference to BS F 100 and improves nomenclature in line with other standards.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

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1 Scope

This British Standard specifies requirements for a range of continuous filament nylon sewing threads for aerospace purposes.

NOTE The latest revision of an Aerospace Series standard is indicated by a prefix number.

2 References

2.1 Normative references

This British Standard incorporates, by reference, provisions from specific editions of other publications. These normative references are cited at the appropriate points in the text and the publications are listed on the inside back cover. Subsequent amendments to, or revisions of, any of these publications apply to this standard only when incorporated in it by updating or revision.

2.2 Informative reference

This British Standard refers to another publication that provides information. The edition of this publication current at the time of issue of this standard is listed on the inside back cover but references should be made to the latest edition.

3 General requirements

3.1 In addition to the requirements specified in clauses **4**, **5**, **6**, **7** and **8** of this standard, the requirements and tests of the latest edition of BS F 100 as specified in Table 1 shall apply.

Table 1 — General requirements (given in BS F 100)

Section of BS F 100	Section title	Requirements and tests
1	General	All requirements.
2[a]	Quality requirements	Requirements for manufacture of sewing threads only. Requirements for dyed textiles except those related to fabric intended for coating. Requirements for freedom from corrosive impurities (see Section **4** of BS F 100).
3	Physical tests	Tests for breaking strength and extension under force.
4	Chemical tests	If required by Section **2**: — test for conductivity of aqueous extract; — test for pH value of aqueous extract; — test for water soluble chloride; — test for water soluble sulfate.

[a] It is not intended that Section **2** tests should be performed on each thread batch. The frequency of these tests should be agreed between the Quality Assurance Authority and the thread manufacturer.

3.2 Threads manufactured in accordance with this standard shall conform to the following.

a) *Freedom from faults*. Threads shall have uniformity of thickness, construction and component ply tension so that there are no visually irregular twist faults. Threads of length per unit mass less than 9 000 m/kg shall not contain thread knots. Threads of length per unit mass greater than 9 000 m/kg shall not contain more than two thread knots per package.

b) *Length per unit mass*. The length per unit mass of thread shall be determined in accordance with BS EN ISO 2060:1995, option 1.

4 Yarn

The threads shall be manufactured from bright continuous filament nylon 6.6 yarn.

5 Construction and properties

5.1 Threads shall conform to the requirements of Table 2.

5.2 Threads shall be supplied with twist levels selected from within the range given in Table 2. The twist shall be determined in accordance with BS EN ISO 2061:1996. The tolerance on twist shall not vary from the level selected by more than the following:

a) selected value of twist up to and including 400 turns per metre (tpm): ±40 tpm;

b) selected value of twist greater than 400 turns per metre (tpm): ±10 %.

6 Finish

6.1 Condition of material

The thread shall be supplied in one of the following conditions:

a) undyed;

b) undyed and bonded;

c) dyed;

d) dyed and bonded.

NOTE The condition required should be stated in the contract or order.

6.2 Dyeing

Where dyeing is required, the colour shall be specified either by reference to a British Standard, e.g. BS 381C, or otherwise by pattern.

6.3 Finish

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

6.4 The added mass due to the dye and/or finish shall not exceed a total of 12 % of the original mass.

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

Table 2 — Construction and properties

Designation		Structure	Minimum length per unit mass[a]	Minimum average breaking strength
Unbonded	Bonded	Nominal dtex/turns per metre (tpm)	m/kg	N
NT1	NT1B	78 dtex S 905-1 140 × 3 Z 570-730	36 300	13.5
NT2	NT2B	156 dtex S 315-845 × 3 Z 285-530	18 150	27
NT3	NT3B	235 dtex S 450-690 × 2 Z 380-530	18 150	27
NT4	NT4B	235 dtex S 305-690 × 3 Z 275-470	12 100	40
NT5	NT5B	235 dtex spinning × 2 S 380-590 × 3 Z 270-415 or 470 dtex S 380-590 × 3 Z 270-415	6 050	80
NT6	NT6B	235 dtex spinning × 3 S 315-435 × 3 Z 215-295 or 700 dtex S 315-435 × 3 Z 215-295	4 025	120
NT7	NT7B	235 dtex spinning × 4 S 295-375 × 3 Z 155-295 or 470 dtex spinning × 2 S 295-375 × 3 Z 155-295 or 950 dtex S 295-375 × 3 Z 155-295	3 025	160
NT8	NT8B	235 dtex spinning × 5 S 215-295 × 3 Z 120-195 or 1 160 dtex S 215-295 × 3 Z 120-195	2 425	200
NT9	NT9B	110 dtex S 445-965 × 3 Z 405-570	24 200	20
NT10	NT10B	235 dtex S 295-500 × 4 Z 250-350	9 050	54
NT11	NT11B	940 dtex spinning × 2 S 180-280 × 3 Z 105-200 or 470 dtex spinning × 4 S 180-280 × 3 Z 105-200	1 400	335
NT12	NT12B	312 dtex S 430-600 × 3 Z 295-375	9 050	54

NOTE The finished twist direction may be reversed from that specified (in which case the primary twist direction is also reversed) and should be stated in the contract or order.

[a] The values stated exclude the mass of added dye and/or finish.

7 Type tests

7.1 General

7.1.1 The type tests specified in **7.2**, **7.3**, **7.4** and **7.5** shall be carried out to the satisfaction of the quality assurance authority.

7.1.2 After initial satisfaction of the type tests, no changes in respect of either the materials or processing conditions used are to be made without the type tests being repeated to the satisfaction of the quality assurance authority.

7.1.3 The manufacturer's records of type approval tests shall be made available to the quality assurance authority on request.

7.2 Loop breaking load (type test)

Threads shall have a minimum average loop breaking load as given in Table 3 when tested in accordance with BS 1932-2:1989.

Table 3 — Loop breaking load

Designation		Minimum average loop breaking load
Unbonded	Bonded	N
NT1	NT1B	16
NT2	NT2B	32
NT3	NT3B	32
NT4	NT4B	48
NT5	NT5B	96
NT6	NT6B	144
NT7	NT7B	192
NT8	NT8B	240
NT9	NT9B	24
NT10	NT10B	64
NT11	NT11B	402
NT12	NT12B	64

7.3 Extension under force (type test)

The extension of the threads, when subjected to a force equal to 25 % of the specified breaking strength as given in Table 2 for (60 ± 5) s, shall not exceed 12 %.

7.4 Dimensional stability on heating in boiling water (type test)

When determined in accordance the latest edition of BS F 100, the mean shrinkage of the threads in boiling water shall not exceed 3.5 %.

7.5 Sewing properties (type test)

7.5.1 Threads of minimum length per unit mass of not less than 9 000 m/kg shall be tested in accordance with Annex A. The stitching pattern shall be completed without slipped or broken stitches, and there shall not be more than two malformed stitches.

7.5.2 Threads other than those specified in **7.5.1** shall be tested in accordance with Annex B. The stitching patterns shall be completed without slipped or broken stitches, and there shall not be more than two malformed stitches.

8 Identification

The thread shall be identified, for ordering purposes, by the number of this British Standard, i.e. BS 5F 120[1)], together with the relevant designation given in Table 2 and, if required dyed, the colour.

NOTE This identification may be codified. For example, thread NT5, required bonded and dyed NATO green, may be identified as BS 5F 120/NT5B/BS 381C No. 285.

[1)] Marking BS 5F 120 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Annex A
Method of test for sewing properties (threads of length per unit mass not less than 9 000 m/kg)

A.1 Apparatus

The apparatus required is a twin-needle lock stitch sewing machine, capable of a stitching rate of (3 250 ± 250) stitches/min at a pitch of 8 stitches per 25 mm, properly adjusted for tension, 8 mm gauge, and fitted with an appropriate needle.

A.2 Test piece

The test piece consists of four full-width lengths, each approximately 1 m long, of nylon fabric conforming to BS F 118 fabric 556 (F118/556), laid out in a stack.

A.3 Procedure

Stitch the test piece at the rate given in **A.1**, as shown in Figure A.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.

A.4 Examination

Examine the test piece for slipped, broken or malformed stitches.

All dimensions in millimetres

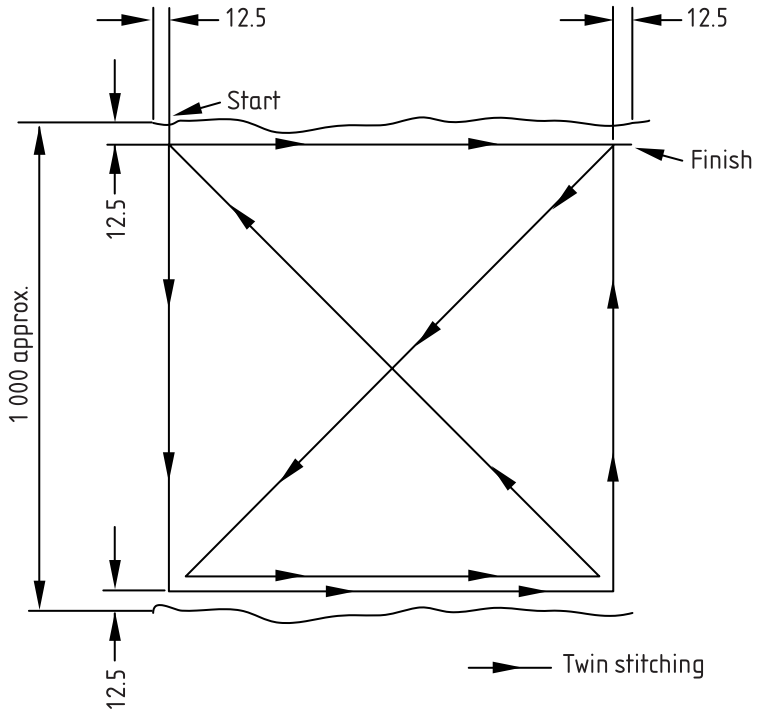


Figure A.1 — Test piece for threads of length per unit mass not less than 9 000 m/kg

Annex B
Method of test for sewing properties (threads of length per unit mass less than 9 000 m/kg)

B.1 Apparatus

The apparatus required is a single-needle lock stitch sewing machine, capable of a stitching rate of (250 ± 40) stitches/min at a pitch of 5 stitches per 25 mm, properly adjusted for tension and fitted with an appropriate needle. Application of lubricant to the needle is permitted.

B.2 Test pieces

B.2.1 Four test pieces are required using the following:

a) dyed nylon webbing to BS F 124 fabric 244 (BS F124/244);

b) dyed nylon webbing to BS F 124 fabric 161 (BS F124/161) polyurethane treated;

c) dyed polyester webbing to BS F 129 fabric 215 (BS F129/215);

d) dyed polyester webbing to BS F 129 fabric 655/1 (BS F129/655/1).

B.2.2 Each test piece consists of the following number of thicknesses of webbing, approximately 45 mm wide and 0.5 m long:

a) for threads NT5 and NT6: two thicknesses;

b) for threads NT7, NT8 and NT11: three thicknesses.

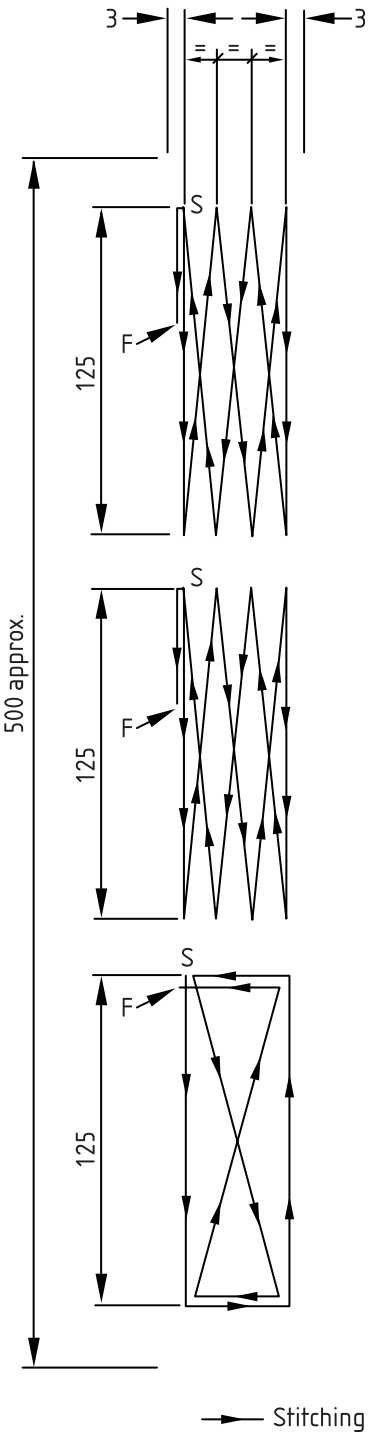
B.3 Procedure

Stitch together the webbings of each test piece with two four-point double Ws and a gate pattern, as shown in Figure B.1.

B.4 Examination

Examine the test pieces for slipped, broken or malformed stitches.

All dimensions in millimetres



NOTE S is the start of the sewing pattern.
F is the finish of the sewing pattern.

Figure B.1 — Test piece for threads of length per unit mass less than 9 000 m/kg

List of references (see clause 2)

Normative references

BSI standards publications

BRITISH STANDARDS INSTITUTION, London

BS 1932, *Testing the strength of yarns and threads from packages.*

BS 1932-2:1989, *Methods for determination of knot strength and loop strength.*

BS EN ISO 2060:1995, *Textiles — Yarn from packages — Determination of linear density (mass per unit length) by the skein method.*

BS EN ISO 2061:1996, *Textiles — Determination of twist in yarns — Direct counting method.*

BS EN ISO 3696, *Specification for water for laboratory use.*

BS 2648:1955, *Performance requirements for electrically-heated laboratory drying ovens.*

BS 6F 100, *Procedure for inspection and testing of textiles for aerospace purposes.*

BS 4F 118, *Specification for 50 g/m² nylon parachute fabric.*

BS 3F 124, *Specification for woven nylon 6.6 narrow fabrics for aerospace purposes (nominally 940 dtex yarns).*

BS 2F 129, *Specification for woven polyester narrow fabrics for aerospace purposes.*

Informative references

BSI standards publications

BRITISH STANDARDS INSTITUTION, London

BS 381C:1988, *Specification for colours for identification, coding, and special purposes.*

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