BRITISH STANDARD AEROSPACE SERIES

BS 2F 132:2002
(Superseding BS F 132:1987)

Braided nylon cord with specified dimensional stability for aerospace purposes

ICS 49.025.40

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.

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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 for textiles of a quality suitable for aerospace purposes.

This British Standard supersedes BS F 132:1987 which is withdrawn.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.

This standard specifies requirements for braided nylon cord with specified dimensional stability manufactured from twist set yarn, as previously defined in Ministry of Defence DTD Specification 5620, which this standard replaces. It differs from DTD Specification 5620 primarily in that prestabilized yarns are now permitted.

Braided nylon cord with unspecified dimensional stability, manufactured from non-twist set yarn and/or twist set yarn, as previously defined in Ministry of Defence DTD Specification 5620, is specified in BS F 135.

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.

The quality assurance authority referred to in this standard is as stated in the contract or order, or the accredited representative of the authority stated, as instructed by the prime contractor.

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 braided nylon cord with specified dimensional stability, manufactured from twist set yarn for aerospace purposes.

NOTE 1 The titles of the publications referred to in this standard are listed on the inside back cover.

NOTE 2 The latest revision of an Aerospace Series standard is indicated by a prefix number.

2 General requirements

In addition to the requirements specified in clauses **3**, **4**, **5** and **6** 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 cordage only. Requirements for dyed textiles except those related to fabric intended for coating. Requirements for dimensions and tolerances of length of cordage except those relating to laid ropes. Requirements for freedom from corrosive impurities (see Section **4** of BS F 100). Requirements for freedom from faults of braided cordage only.
3	Physical tests	Tests for the determination of the mass of cordage. Tests for breaking strength of cordage. Tests for sheath slackness and core looping of braided cordage. Tests for plaits per unit length in braided cordage.
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 batch. The frequency of these tests should be agreed between the quality assurance authority and the cordage manufacturer.

3 Yarn

3.1 The cord shall be manufactured from continuous filament bright nylon 6.6 yarns, which shall have the tenacity and extension at break as given in Table 2.

Table 2 — Yarn properties

Nominal dtex	78	235	940
Nominal number of filaments	34	34	140
Tenacity (cN/tex)	68 to 75	68 to 77	71 to 82
Extension at break (%)	13 to 18	13 to 20	13 to 22

3.2 The yarn shall conform to the properties given in Table 2 to the satisfaction of the quality assurance authority when assessment is based on the manufacturer's quality control procedures.

NOTE In case of dispute, the tenacity and extension at break shall be determined by the method of test and sampling given in BS EN ISO 2062:1995 and BS EN ISO 2060:1995, option 1.

3.3 The yarn shall not be sized.

4 Construction and properties

4.1 General

4.1.1 The cords shall be braided from yarns which conform to the relevant requirements of Table 2, Table 3, Table 4, Table 5, Table 6, Table 7 and Table 8.

4.1.2 The construction and properties of the finished cords shall conform to Table 3, Table 4, Table 5, Table 6, Table 7 and Table 8, **4.2**, **4.3**, **4.4**, clause **5** and clause **6**.

4.2 Dimensional stability

4.2.1 Unstabilized yarns shall be subjected to a setting treatment after twisting and prior to braiding.

NOTE 1 The purpose of the setting treatment is to ensure the production of cords with consistent dimensional stability. Setting may be carried out by means of steam or dry heat provided the finished cord conforms to **4.2.5**.

NOTE 2 Prestabilized yarns may require a setting treatment after twisting in order to conform to BS F 100 for twist liveliness.

4.2.2 Unstabilized and prestabilized yarns shall not be used in the same cord.

4.2.3 Cord SB 603 shall be made from yarns which have been heat set after twisting.

4.2.4 The cord shall not be set after braiding.

4.2.5 The shrinkage of the finished cords in water shall not be greater than 3.0 % when measured in accordance with Annex A.

4.3 Identification threads

All cords shall contain coloured threads in the sheath to denote dimensionally stable cords, the colour being indicated in a footnote to Table 3, Table 4, Table 5, Table 6, Table 7 and Table 8. Coloured identification threads shall consist of whole ends which are part of the cord construction specified in Table 3, Table 4, Table 5, Table 6, Table 7 and Table 8.

4.4 Sheath slackness and core looping

Finished cords constructed as given in Table 3, Table 4 and Table 5 shall exhibit a maximum of 3 mm sheath slackness, and shall be free from core looping.

5 Finish

5.1 General

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

a) undyed; or

b) dyed.

NOTE When dyed cord is required, an increase in the mass per unit length of 10 % over that specified in Table 3, Table 4, Table 5, Table 6, Table 7 and Table 8 is permitted.

5.2 Dyeing

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

5.2.2 Where dyeing is required, the yarns from which the cord is manufactured shall be dyed. Dyeing of the cord shall not be permitted after manufacture.

6 Identification

Cords shall be identified, for ordering purposes, by the number of this British Standard, i.e. BS 2F 132[1)], together with the cord designation and, if required dyed, the colour.

NOTE This identification may be codified. For example, cord CA 102, required dyed NATO green, may be identified as BS 2F 132/CA 102/BS 381C No. 285.

[1)] Marking BS 2F 132 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 therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Table 3 — Cord construction and properties of cords CA: nominal 78 dtex (34 filaments) nylon

Designation			Sheath							Core			
Cord designation	Maximum mass per unit length	Minimum breaking strength	Number of spindles on braider	Total number of ends	Construction of each end	Twist (first time)	Twist (second time)	Plaits/m	Cord interlacing diagram (see Figure 1)	No. of ends	Construction of each end	Twist (first time)	Twist (second time)
	g/m	N			dtex	turns/m	turns/m				dtex	turns/m	turns/m
CA 101	0.9	310	8 + 8	8 + 8	78 × 5	240 (Z)	—	950 ± 80	A	2	78 × 5	240 (Z)	—
CA 102	1.8	445	8 + 8	16 + 16	78 × 5	240 (Z)	—	950 ± 80	A	1	78 × 5 × 3	310 (S)	240 (Z)
CA 103	3.7	1 350	8 + 8	8 + 8	78 × 5 × 3	310 (S)	240 (Z)	690 ± 40	A	3	78 × 10 × 3	310 (S)	240 (Z)
CA 104	5.5	1 800	8 + 8	16 + 16	78 × 4 × 3	310 (S)	240 (Z)	470 ± 40	A	4	78 × 10 × 3	310 (S)	240 (Z)
CA 105	7.1	2 450	8 + 8	16 + 16	78 × 5 × 3	310 (S)	240 (Z)	470 ± 40	A	4	78 × 13 × 3	310 (S)	240 (Z)
CA 106	9.9	3 100	8 + 8	24 + 24	78 × 5 × 3	310 (S)	240 (Z)	390 ± 40	A	4	78 × 13 × 3	310 (S)	240 (Z)
All cords shall have green marker thread in sheath (BS 381C:228 emerald green).													
NOTE Twist tolerances: first time ±10 %; second time ±15 %.													

Table 4 — Cord construction and properties of cords CB: nominal 235 dtex (34 filaments) nylon

Designation			Sheath							Core			
Cord designation	Maximum mass per unit length	Minimum breaking strength	Number of spindles on braider	Total number of ends	Construction of each end	Twist (first time)	Twist (second time)	Plaits/m	Cord interlacing diagram (see Figure 1)	No. of ends	Construction of each end	Twist (first time)	Twist (second time)
	g/m	N			dtex	turns/m	turns/m				dtex	turns/m	turns/m
CB 201	2.5	890	8 + 8	16 + 16	235 × 2	310 (Z)	—	670 ± 80	A	2	235 × 3 × 3	280 (S)	200 (Z)
CB 202	3.8	1 350	8 + 8	8 + 8	235 × 3 × 2	280 (S)	200 (Z)	670 ± 80	A	3	235 × 3 × 3	280 (S)	200 (Z)
CB 203	5.5	1 800	8 + 8	8 + 8	235 × 3 × 3	280 (S)	200 (Z)	470 ± 40	A	4	235 × 3 × 3	280 (S)	200 (Z)
CB 204	11	3 100	8 + 8	16 + 16	235 × 3 × 3	280 (S)	200 (Z)	430 ± 40	A	4	235 × 6 × 3	280 (S)	200 (Z)
CB 205	17	5 350	8 + 8	24 + 24	235 × 3 × 3	280 (S)	200 (Z)	280 ± 40	A	6	235 × 6 × 3	280 (S)	200 (Z)
All cords shall have black marker thread in sheath.													
NOTE Twist tolerances: first time ±10 %; second time ±15 %.													

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Table 5 — Cord construction and properties of cords CC: nominal 940 dtex (140 filaments) nylon

Designation			Sheath							Core			
Cord designation	Maximum mass per unit length g/m	Minimum breaking strength N	Number of spindles on braider	Total number of ends	Construction of each end dtex	Twist (first time) turns/m	Twist (second time) turns/m	Plaits/m	Cord interlacing diagram (see Figure 1)	No. of ends	Construction of each end dtex	Twist (first time) turns/m	Twist (second time) turns/m
CC 302	4.6	2 000	8 + 8	16 + 16	940	110 (Z)	—	440 ± 40	A	2	940 × 4	150 (Z)	—
CC 303	7.1	2 200	8 + 8	8 + 16	940 × 1 × 2	240 (S)	160 (Z)	470 ± 40	B	4	940 × 1 × 3	240 (S)	160 (Z)
CC 305	11.5	4 000	12 + 12	12 + 24	940 × 1 × 2	240 (S)	160 (Z)	470 ± 40	B	8	940 × 1 × 3	240 (S)	160 (Z)
All cords shall have orange marker thread in sheath (BS 381C:557 light orange).													
NOTE Twist tolerances: first time ±10 %; second time ±15 %.													

Table 6 — Cord construction and properties of cords SA: nominal 78 dtex (34 filaments) nylon

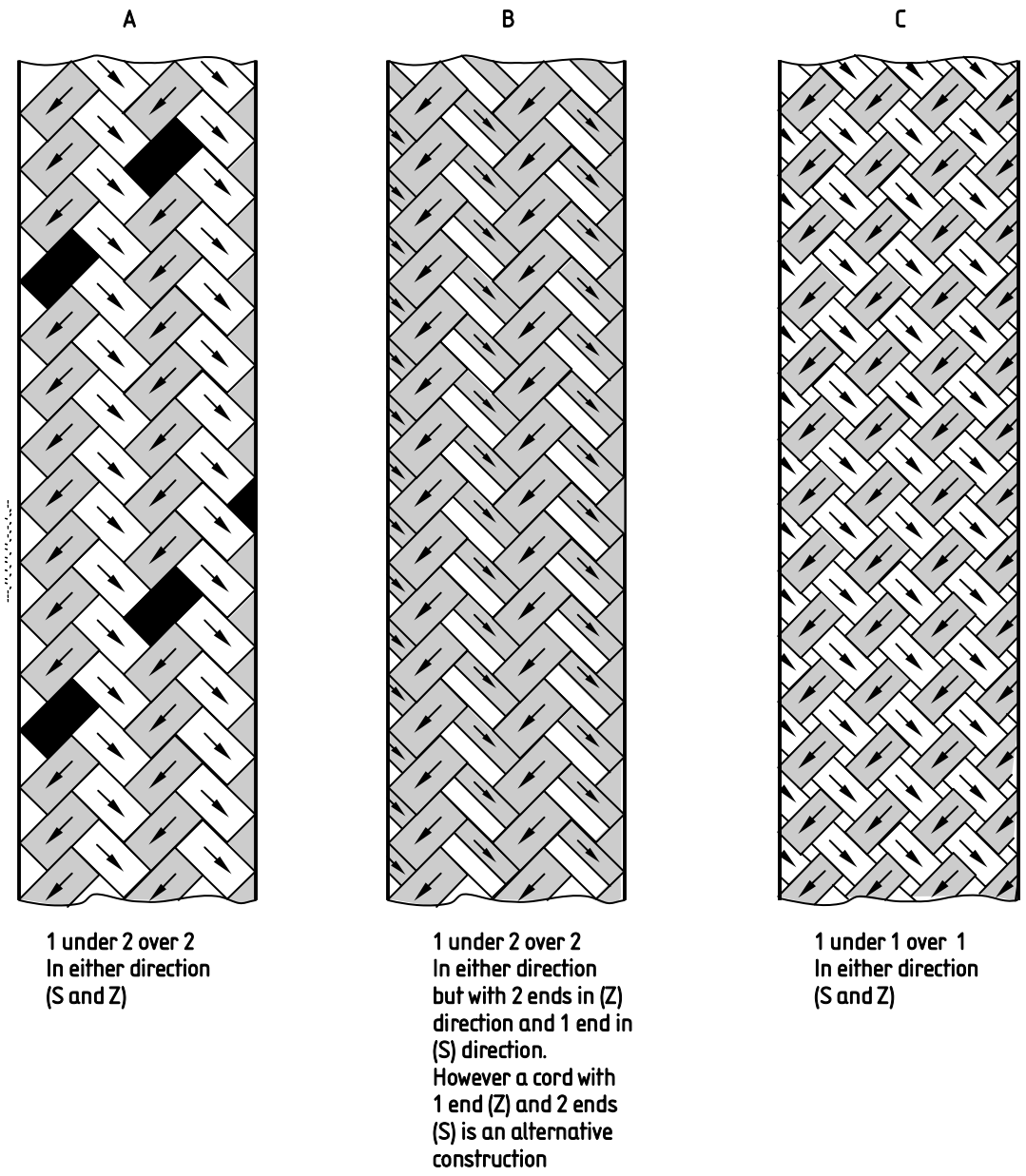
Designation			Sheath					
Cord designation	Maximum mass per unit length g/m	Minimum breaking strength N	Number of spindles on braider	Total number of ends	Construction of each end dtex	Twist turns/m	Plaits/m	Cord interlacing diagram (see Figure 1)
SA 501	0.60	220	8 + 8	8 + 8	78 × 4	240 (Z)	950 ± 80	A
Cord SA 501 shall have green marker thread in sheath (BS 381C:228 emerald green).								
NOTE Twist tolerance: ±10 %.								

Table 7 — Cord construction and properties of cords SB: nominal 235 dtex (34 filaments) nylon

Designation			Sheath						
Cord designation	Maximum mass per unit length	Minimum breaking strength	Number of spindles on braider	Total number of ends	Construction of each end	Twist (first time)	Twist (second time)	Plaits/m	Cord interlacing diagram (see Figure 1)
	g/m	N			dtex	turns/m	turns/m		
SB 603	1.9	670[a]	8 + 8	8 + 8	235 × 3 and 235 × 4 alternate ends	180 (S)	—	1 030 ± 80	A
SB 604	14	3 300	8 + 8	16 + 16	235 × 4 × 3	240 (S)	180 (Z)	430 ± 40	A
SB 605	20	5 350	8 + 8	24 + 24	235 × 4 × 3	240 (S)	180 (Z)	310 ± 40	A
SB 606	33	7 800	4 + 4	12 + 12	235 × 10 × 4	180 (S)	100 (Z)	120 ± 10	C
SB 607	24	6 650	24 + 24	24 + 24	235 × 5 × 3	310 (S)	200 (Z)	350 ± 40	A
All cords shall have black marker thread in sheath.									
NOTE Twist tolerances: first time ±10 %; second time ±15 %.									
[a] The breaking strength of cord SB 603 shall not exceed 800 N.									

Table 8 — Cord construction and properties of cords SC: nominal 940 dtex (140 filaments) nylon

Designation			Sheath						
Cord designation	Maximum mass per unit length	Minimum breaking strength	Number of spindles on braider	Total number of ends	Construction of each end	Twist (first time)	Twist (second time)	Plaits/m	Cord interlacing diagram (see Figure 1)
	g/m	N			dtex	turns/m	turns/m		
SC 701[a]	9.0	3 350	8 + 8	8 (S) + 8 (Z)	940 × 4 and 940 × 5	120 (S) 120 (Z)	—	370 ± 40	A
SC 702	16	6 500	8 + 8	8 + 8	940 × 8	110 (Z)	—	300 ± 40	A
SC 704[b]	66	15 600	4 + 4	16 + 16	940 × 5 × 3	90 (Z)	50 (S)	90 ± 10	C
SC 705	62	17 800	12 + 12	12 (S) + 12 (Z)	940 × 6 × 3	90 (S) 90 (Z)	80 (Z) 80 (S)	200 ± 40	A
All cords shall have orange marker thread in sheath. (BS 381C: 557 light orange.)									
NOTE Twist tolerances: first time ±10 %; second time ±15 %.									
[a] For SC 701, the interlaced yarns are S and Z twist, i.e. yarns braiding in the S direction shall have the S twist and yarns braiding in the Z direction shall have the Z twist. [b] For SC 704, the direction of twist (first time and second time) may be reversed.									



NOTE Rectangles with arrows represent a single or group of ends per spindle (carrier).

Rectangles (or squares) without arrows represent spaces although ends may expand and twist up to fill the space.

Figure 1 — Braid interlacing

Annex A
Method for determination of shrinkage in water at 55 °C

A.1 Cut three lengths of cord measuring approximately 1 m each from the sample unit and heat seal or knot each end. Apply a load of 1.0 % of the specified minimum breaking strength. After (60 ± 10) s, mark a 50 cm gauge length on each specimen with insoluble ink or thread stitch.

A.2 Release the load and immerse the cords loosely in water maintained at (55 ± 2) °C. After 1 h remove the cords from the water and allow to dry loosely in air at 20 °C to 22 °C for 24 h. Remeasure under load as described above. Ensure that measuring of the specimen before and after treatment is carried out after conditioning to conform to BS F 100.

NOTE A wetting agent may be necessary to ensure wetting of the cords.

A.3 Calculate the percentage change in gauge length, S (in mm), of each specimen using the following equation:

$$S = \frac{L_1 - L_2}{L_1} \times 100$$

where

L_1 is the gauge length before immersion in water (in mm);

L_2 is the gauge length after immersion in water (in mm).

Calculate the arithmetic mean of the three individual values for each sample and express this as the mean shrinkage in water at 55 °C.

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Publications referred to

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

BS F 135, *Specification for braided nylon cord with unspecified dimensional stability.*

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

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

BS EN ISO 2062:1995, *Textiles — Yarn from packages — Determination of single-end breaking force and elongation at break.*

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