

**Ministry of Defence
Defence Procurement Agency, ADRP2
Abbey Wood
Bristol
BS34 8JH**

OBSOLESCENCE NOTICE

All DTD specifications were declared obsolescent from 1st April 1999. All DTD 900 series approvals also lapsed at that time. The standards will no longer be updated but will be retained as obsolescent documents to provide for the servicing of existing equipment.

Further Guidance

The aim in declaring the specifications obsolescent is to recognise that the documents are not being updated and thus should be used with care by both purchaser and supplier. For example, a specification could contain valid technical information but may also contain type approval clauses that contradict procurement policy and/or use materials that do not comply with environmental legislation. The obsolescent specification can still be used as a basis for a purchase provided that the supplier and purchaser agree suitable changes to the specification within the purchase order/contract.

For the DTD 900 system, each specification has provided an MoD approved material and process. For these items, the declaration of obsolescence will constitute the termination of both the extant MoD approval and the continuing MoD assessment that had underpinned those approvals. Again, the technical content of the document remains valid and can be used by both purchaser and supplier as a basis for a contract but an acceptable (to the parties) approval/assessment procedure would be required.

*Superseding and incorporating
D.T.D. 5502B, A, 786E, 689
IACS 1120 and 1122
MBFD 51,52
A H 237-238,234 and 244
GQ/MS 177 and 232
RFGQ 475
January 1977*

**Aircraft Material Specification
BRAIDED NYLON CORD**

NOTE: This specification is one of a series issued by the Procurement Executive, Ministry of Defence, either to meet a limited requirement not covered by any existing British Standard, or to serve as a basis for inspection of material, the properties and uses of which are not sufficiently developed to warrant submission to the British Standards institution for standardisation.

1. Scope

This specification stipulates the requirements, for braided nylon cord for aerospace purposes in a range of types and constructions.

2. General Requirements

In addition to the specific requirements stipulated in Clauses 3 to 5 below the relevant portions of British Standard F.100 shall apply.

3. Yarn

3.1 Continuous filament bright nylon 66 yarn of tenacity in each case appropriate to the properties of the cord required shall be used in the manufacture of the cord. The yarn shall have the tenacity, extension at break and stress at 2% extension as given in the following table:

	78 dtex 34 filaments	235 dtex 34 filaments	470 dtex 68 filaments	940 dtex 140 filaments	1400 dtex 210 filaments
Tenacity (g/dtex)	6.8-7.6	6.8-7.6	6.8-7.6	7.4-8.2	7.4-8.2
Extension at Break (%)	13-17	13-17	13-17	11.5-15.5	11.5-15.5
Stress at 2% extension (g/dtex) (Type Test)	0.68-0.92	0.68-0.92	0.68-0.92	0.64-0.88	0.64-0.88

Compliance with these requirements may be obtained from the yarn manufacturer on the basis of his Quality Control procedures by arrangement with the appropriate Quality Assurance Authority. Alternatively the tenacity and extension at break results shall be determined by the method of test and sampling given in British Standard 1932: Part 1: 1965.

The stress at 2% extension shall be measured as follows:

From the load-extension diagrams the individual loads corresponding to 2% extension are determined and then the mean value calculated; division of the mean by the nominal decitex figure gives the mean stress at 2% extension in grams per decitex.

3.2 The yarn shall not be sized.

4. Manufacture:

4.1 The construction and properties of the cord shall comply with the requirements of tables 1 to 6 and to this specification.

4.2 The cords listed in tables 1, 2, 3, 4, 5 and 6 require the use of twist set yarns. The shrinkage of these cords in water as measured by the method given in Appendix 1 shall be not greater than 3.0%, with the exception of cord CC302, where the shrinkage as measured by the method of Appendix 2 shall not exceed 1.0%.

- 4.3** The cords listed in tables 1A, 2A, 3A, 4A, 5A and 6A do not require the use of twist set yarns, though their use is permitted, and the shrinkage requirements of clause 4.2 do not apply to these cords.
- 4.4** The cord shall be supplied in the undyed state unless otherwise stipulated in the contract or order. The cord shall be free from stain. When dyed cord is required, an increase in mass per unit length of 10 per cent over that specified in the Tables is permitted.
- 4.5** Cord constructed with a core shall exhibit a maximum of 3mm sheath slackness and shall be free from core looping.

NOTE: Excessive shrinkage may occur with non-twist set yarns.

5. Identification

- 5.1.1 In certain cords coloured threads* are required to be incorporated in the core to indicate the cord manufacturer (Cords CA 105, CA115, CB 203, CB 213).
- 5.1.2 Certain cords, indicated by a footnote in the Tables, shall contain coloured threads in the sheath to denote the use of twist set yarns. Coloured identification threads shall consist of whole ends which are part of the cord construction.
- 5.2** For brevity on documents and drawings the cord shall be identified by the number and cord designation of this specification and, if dyed, by the colour required. For example DTD 5620/CA 103/olive drab to B.S.381. C.298.

*Application for approval of colours to denote manufacturers for the cords stipulated shall be addressed to the Director of Quality Assurance (PQ0 NM2), Ministry of Defence, Harefield House, Harefield, Uxbridge, Middlesex.

Approved for issue,

N. L. PARR,

Director of Research Materials.

APPENDIX 1**Method for the Determination of Shrinkage in Water at 55°C**

Cut three lengths of cord measuring approximately 1 metre each from the sample unit and heat seal or knot ends. Apply a load of 1.0% of the minimum specified breaking strength, wait for 1 minute and mark out a 50cm gauge length on each specimen with insoluble ink or thread stitch.

Immerse the cords loosely in water containing sufficient wetting agent maintained at $55^{\circ}\text{C} \pm 2^{\circ}\text{C}$. After 1 hour remove the cords from the water and allow to dry loosely in air at $20\text{-}22^{\circ}\text{C}$ for 24 hours. Measuring of specimen before and after treatment shall be carried out after conditioning as required in BS. F. 100.

APPENDIX 2**Method for the Determination of Shrinkage in Boiling Water**

Cut three lengths of cord measuring approximately 1 metre each from sample unit and heat seal or knot ends - apply a load of 1.0% of the minimum breaking strength, wait for 1 minute, and mark off a 50cm gauge length on each specimen with insoluble ink or thread stitch.

Immerse specimens in boiling water for 15 minutes, remove and air dry at a temperature not exceeding 85°C .

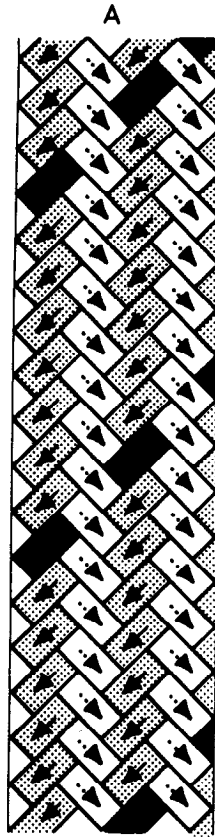
Remeasure under load as above, calculate the percentage change in the gauge length and report the average shrinkage.

Measuring of specimens before and after treatment shall be carried out after conditioning as required in BS. F. 100.

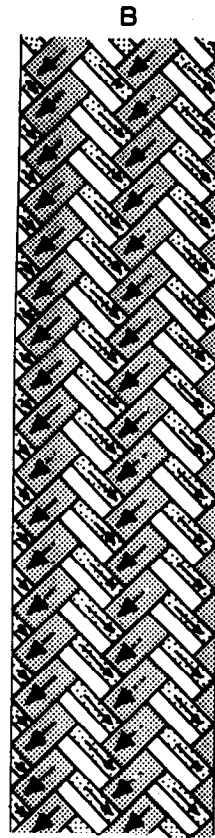
BRAID INTERLACING

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

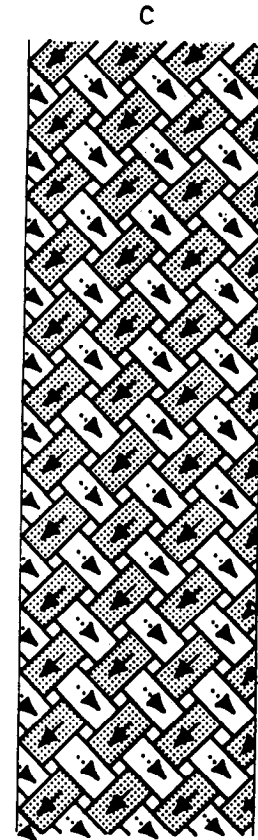
Rectangles (or squares) without arrows represent spaces although ends may expand and twist up to fill the space



1 UNDER 2 OVER 2
In either direction
(S and Z)



1 UNDER 2 OVER 2
In either direction
but with 2 ends in (Z)
direction and 1 end in
(S) direction
However a cord with
1 end (Z) and 2 ends
(S) is an alternative
construction



1 UNDER 1 OVER 1
In either direction
(S and Z)

AIRCRAFT MATERIAL SPECIFICATION BRAIDED NYLON CORD

Cords with core (C)

Table 1. Cords CA – From 78 Decitex (34 fils) nylon (twist set yarns)

Cord designation	Old specification and designation	Sheath							Core					Cord		Cord interlacing diagram
		Number of spindles on braider	Total number of ends	Construction of each end (Decitex)	Turns per metre (first time)	Turns per metre (second time)	Yarns to be twist set	Plaits per metre	No. of ends	Construction of each end (Decitex)	Turns per metre (first time)	Turns per metre (second time)	Yarns to be twist set	Maximum weight g/m	Minimum breaking strength (Newtons)	
CA 101		8 + 8	8 + 8	78 x 5	240 (Z)	—	YES	950 ± 80	2	78 x 5	240 (Z)	—	YES	0.9	310	A
CA 102		8 + 8	16 + 16	78 x 5	240 (Z)	—	YES	950 ± 80	1	78 x 5 x 3	310 (S)	240 (Z)	YES	1.8	445	A
CA 103	IACS 1122 (300 lb)	8 + 8	8 + 8	78 x 5 x 3	310 (S)	240 (Z)	YES	690 ± 40	3	78 x 10 x 3	310 (S)	240 (Z)	YES	3.7	1350	A
CA 104	IACS 1122 (400 lb)	8 + 8	16 + 16	78 x 4 x 3	310 (S)	240 (Z)	YES	470 ± 40	4	78 x 10 x 3	310 (S)	240 (Z)	YES	5.5	1800	A
CA 105	IACS 1122 (550 lb)	8 + 8	16 + 16	78 x 5 x 3	310 (S)	240 (Z)	YES	470 ± 40	4	78 x 13 x 3	310 (S)	240 (Z)	YES	7.1	2450	A
CA 106	IACS 1122 (700 lb)	8 + 8	24 + 24	78 x 5 x 3	310 (S)	240 (Z)	YES	390 ± 40	4	78 x 13 x 3	310 (S)	240 (Z)	YES	9.9	3100	A

Cords CA 101, 102, 103, 104, 105, 106 have green marker thread in sheath

Table 1A. Cords CA – from 78 Decitex (34 fils) nylon

CA 111		8 + 8	8 + 8	78 x 5	240 (Z)	—	NO	950 ± 80	2	78 x 5	240 (Z)	—	NO	0.9	310	A
CA 112		8 + 8	16 + 16	78 x 5	240 (Z)	—	NO	950 ± 80	1	78 x 5 x 3	310 (S)	240 (Z)	NO	1.8	445	A
CA 113	IACS 1122 (300 lb)	8 + 8	8 + 8	78 x 5 x 3	310 (S)	240 (Z)	NO	690 ± 40	3	78 x 10 x 3	310 (S)	240 (Z)	NO	3.7	1350	A
CA 114	IACS 1122 (400 lb)	8 + 8	16 + 16	78 x 4 x 3	310 (S)	240 (Z)	NO	470 ± 40	4	78 x 10 x 3	310 (S)	240 (Z)	NO	5.5	1800	A
CA 115	IACS 1122 (550 lb)	8 + 8	16 + 16	78 x 5 x 3	310 (S)	240 (Z)	NO	470 ± 40	4	78 x 13 x 3	310 (S)	240 (Z)	NO	7.1	2450	A
CA 116	IACS 1122 (700 lb)	8 + 8	24 + 24	78 x 5 x 3	310 (S)	240 (Z)	NO	390 ± 40	4	78 x 13 x 3	310 (S)	240 (Z)	NO	9.9	3100	A

AIRCRAFT MATERIAL SPECIFICATION BRAIDED NYLON CORD

Table 2. Cords CB – from 235 Decitex (34 fils) nylon (twist set yarns)

Cord designation	Old specification and designation	Number of spindles on braider	Total number of ends	Sheath					Core					Cord		Cord interlacing diagram
				Construction of each end (Decitex)	Turns per metre (first time)	Turns per metre (second time)	Yarns to be twist set	Plaits per metre	No. of ends	Construction of each end (Decitex)	Turns per metre (first time)	Turns per metre (second time)	Yarns to be twist set	Maximum weight g/m	Minimum breaking strength (Newtons)	
CB 201	DTD 5502/2	8 + 8	16 + 16	235 x 2	310 (Z)	—	YES	670 ± 80	2	235 x 3 x 3	280 (S)	200 (Z)	YES	2.5	890	A
CB 202	DTD 5502/3	8 + 8	8 + 8	235 x 3 x 2	280 (S)	200 (Z)	YES	670 ± 80	3	235 x 3 x 3	280 (S)	200 (Z)	YES	3.8	1350	A
CB 203	DTD 5502/4	8 + 8	8 + 8	235 x 3 x 3	280 (S)	200 (Z)	YES	470 ± 40	4	235 x 3 x 3	280 (S)	200 (Z)	YES	5.5	1800	A
CB 204	DTD 5502/5	8 + 8	16 + 16	235 x 3 x 3	280 (S)	200 (Z)	YES	430 ± 40	4	235 x 6 x 3	280 (S)	200 (Z)	YES	11	3100	A
CB 205	DTD 5502/6	8 + 8	24 + 24	235 x 3 x 3	280 (S)	200 (Z)	YES	280 ± 40	6	235 x 6 x 3	280 (S)	200 (Z)	YES	17	5350	A

Cords CB 201, 202, 203, 204, 205 have black marker thread in sheath

Table 2A. Cords CB – from 235 Decitex (34 fils) nylon

CB 211	DTD 5502/2	8 + 8	16 + 16	235 x 2	310 (Z)	—	NO	670 ± 80	2	235 x 3 x 3	280 (S)	200 (Z)	NO	2.5	890	A
CB 212	DTD 5502/3	8 + 8	8 + 8	235 x 3 x 2	280 (S)	200 (Z)	NO	670 ± 80	3	235 x 3 x 3	280 (S)	200 (Z)	NO	3.8	1350	A
CB 213	DTD 5502/4	8 + 8	8 + 8	235 x 3 x 3	280 (S)	200 (Z)	NO	470 ± 40	4	235 x 3 x 3	280 (S)	200 (Z)	NO	5.5	1800	A
CB 214	DTD 5502/5	8 + 8	16 + 16	235 x 3 x 3	280 (S)	200 (Z)	NO	430 ± 40	4	235 x 6 x 3	280 (S)	200 (Z)	NO	11	3100	A
CB 215	DTD 5502/6	8 + 8	24 + 24	235 x 3 x 3	280 (S)	200 (Z)	NO	280 ± 40	6	235 x 6 x 3	280 (S)	200 (Z)	NO	17	5350	A

AIRCRAFT MATERIAL SPECIFICATION BRAIDED NYLON CORD

Table 3. Cords CC – from 940 (140 fils) or 1400 (210 fils) Decitex nylon (twist set yarns)

Cord designation	Old specification and designation	Sheath							Core					Cord		Cord interlacing diagram
		Number of spindles on braider	Total number of ends	Construction of each end (Decitex)	Turns per metre (first time)	Turns per metre (second time)	Yarns to be twist set	Plaits per metre	No. of ends	Construction of each end (Decitex)	Turns per metre (first time)	Turns per metre (second time)	Yarns to be twist set	Maximum weight g/m	Minimum breaking strength (Newtons)	
CC 302	RFGQ 475	8 + 8	16 + 16	940	110 (Z)	–	YES	440 ± 40	2	940 x 4	150 (Z)	–	YES	4.6	2000	A
CC 303	MBFD 51	8 + 8	8 + 16	940 x 1 x 2	240 (S)	160 (Z)	YES	470 ± 40	4	940 x 1 x 3	240 (S)	160 (Z)	YES	7.1	2200	B
CC 305	MBFD 52	12 + 12	12 + 24	940 x 1 x 2	240 (S)	160 (Z)	YES	470 ± 40	8	940 x 1 x 3	240 (S)	160 (Z)	YES	11	4000	B

For CC 302 (i) the minimum extension should be 30% at the minimum breaking strength
(ii) sheath and core yarns shall be fully relaxed before braiding
(iii) the cord in the finished state shall not have a shrinkage greater than 1.0% when tested by the method described in Appendix 2
(iv) if the cord is required dyed then the sheath yarns shall be dyed to the required colour before braiding

Cords CC 302, 303, 305, have orange marker thread in sheath

Table 3A. Cords CC – from 940 (140 fils) or 1400 (210 fils) Decitex nylon

CC 311	IACS 1120 (450 lb)	8 + 8	16 + 16	940	No added twist	–	NO	430 ± 40	2	940 x 4	100 (Z)	–	NO	4.5	2000	A
CC 312		8 + 8	16 + 16	940	100 (Z)	–	NO	440 ± 40	2	940 x 4	150 (Z)	–	NO	4.6	2000	A
CC 313	MBFD 51	8 + 8	8 + 16	940 x 1 x 2	240 (S)	160 (Z)	NO	470 ± 40	4	940 x 1 x 3	240 (S)	160 (Z)	NO	7.1	2200	B
CC 314	GQ/MS/232	8 + 8	24 + 24	1 at 1400 plus 2 at 940	No added twist	–	NO	470 ± 40	4	940 x 1 x 3	240 (S)	160 (Z)	NO	8.3	3100	A
CC 315	MBFD 52	12 + 12	12 + 24	940 x 1 x 2	240 (S)	160 (Z)	NO	470 ± 40	8	940 x 1 x 3	240 (S)	160 (Z)	NO	11	4000	B
CC 316	AH 237	8 + 8	32 + 32	1400	No added twist	–	NO	300 ± 40	6	940 x 5	100 (Z)	–	NO	15	6500	A

Coreless Cords (S)

Table 4. Cords SA – from 78 Decitex (34 fils) nylon (twist set yarns)

Cord designation	Old specification and designation	Sheath							Core					Cord		Cord interlacing diagram
		Number of spindles on braider	Total number of ends	Construction of each end (Decitex)	Turns per metre (first time)	Turns per metre (second time)	Yarns to be twist set	Plaits per metre	No. of ends	Construction of each end (Decitex)	Turns per metre (first time)	Turns per metre (second time)	Yarns to be twist set	Maximum weight g/m	Minimum breaking strength (Newtons)	
SA 501		8 + 8	8 + 8	78 x 4	240 (Z)	–	YES	950 ± 80						0.60	220	A

Cord SA 501 has green marker thread in sheath

Table 4A. Cords SA – from 78 Decitex (34 fils) nylon

SA 511		8 + 8	8 + 8	78 x 4	240 (Z)	–	NO	950 ± 80						0.60	220	A
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AIRCRAFT MATERIAL SPECIFICATION BRAIDED NYLON CORD

Table 5. Cords SB – from 235 Decitex (34 fils) nylon (twist set yarns)

Cord designation	Old specification and designation	Sheath							Cord		
		Number of spindles on braider	Total number of ends	Construction of each end (Decitex)	Turns per metre (first time)	Turns per metre (second time)	Yarns to be twist set	Plaits per metre	Maximum weight g/m	Minimum breaking strength (Newtons)	Cord interlacing diagram
SB 603	786/4	8 + 8	8 + 8	235 x 3 and 235 x 4 alternate ends	180 (S) 180 (S)	—	YES	830 ± 80	1.7	670 max 800	A
SB 604	786/5	8 + 8	16 + 16	235 x 4 x 3	240 (S)	180 (Z)	YES	430 ± 40	14	3300	A
SB 605	786/6	8 + 8	24 + 24	235 x 4 x 3	240 (S)	180 (Z)	YES	310 ± 40	20	5350	A
SB 606	786/7	4 + 4	12 + 12	235 x 10 x 4	180 (S)	100 (Z)	YES	120 ± 10	33	7800	C
SB 607	DTD 689/1	24 + 24	24 + 24	235 x 5 x 3	310 (S)	200 (Z)	YES	350 ± 40	24	6650	A

Note For cord SB 603 the maximum breaking strength shall be as indicated. Cords SB 603, 604, 605, 606, 607 have black marker thread in sheath

Table 5A. Cords SB – from 235 Decitex (34 fils) nylon

SB 611	786/3	8 + 8	8 + 8	235	No added twist	—	NO	910 ± 80	0.45	180	A
SB 612	786/3/47	8 + 8	8 + 8	235	No added twist	—	NO	910 ± 80	0.45	210 max 260	A
SB 613	786/4	8 + 8	8 + 8	235 x 3 and 235 x 4	180 (S) 180 (S)	—	NO	830 ± 80	1.7	670 max 800	A
SB 614	786/5	8 + 8	16 + 16	235 x 4 x 3	240 (S)	180 (Z)	NO	430 ± 40	14	3300	A
SB 615	786/6	8 + 8	24 + 24	235 x 4 x 3	240 (S)	180 (Z)	NO	310 ± 40	20	5350	A
SB 616	786/7	4 + 4	12 + 12	235 x 10 x 4	180 (S)	100 (Z)	NO	120 ± 10	33	7800	C
SB 617	DTD 689/1	24 + 24	24 + 24	235 x 5 x 3	310 (S)	200 (Z)	NO	350 ± 40	24	6650	A

Note For Cords SB 612 and SB 613 the maximum breaking strength shall be as indicated.

AIRCRAFT MATERIAL SPECIFICATION BRAIDED NYLON CORD

Table 6. Cords SC – from 940 Decitex (140 fils) nylon (twist set yarns)

Cord designation	Old specification and designation	Sheath							Cord		Cord interlacing diagram
		Number of spindles on braider	Total number of ends	Construction of each end (Decitex)	Turns per metre (first time)	Turns per metre (second time)	Yarns to be twist set	Plaits per metre	Maximum weight g/m	Minimum breaking strength (Newtons)	
SC 701	GQ/MS/177	8 + 8	8(S)+8(Z)	940 x 4 and 940 x 5	120 (S) 120 (Z)	–	YES	370 ± 40	9.0	3350	A
SC 702	AH 238	8 + 8	8 + 8	940 x 8	110 (Z)	–	YES	300 ± 40	16	6500	A
SC 704	786/8	4 + 4	16 + 16	940 x 5 x 3	90(Z) or (S)	50 (S) or (Z)	YES	90 ± 10	66	15600	C
SC 705	AH 244	12 + 12	12(S) + 12(Z)	940 x 6 x 3	90(S) or (Z)	80(S) or (S)	YES	200 ± 40	62	17800	A

Cords 701, 702, 704, 705 have orange marker thread in sheath

Table 6A. Cords SC – from 940 (140 fils) Decitex nylon

SC 711	GQ/MS 177	8 + 8	8(S)+8(Z)	940 x 4 and 940 x 5	120 (S) 120 (Z)	–	NO	370 ± 40	9.0	3350	A
SC 712	AH 238	8 + 8	8 + 8	940 x 8	110 (Z)	–	NO	300 ± 40	16	6500	A
SC 713	AH 234	12 + 12	12(S) + 12(Z)	940 x 5 x 2	No added twist	110(S) or (Z)	NO	240 ± 40	28	10700	A
SC 714	786/8	4 + 4	16 + 16	940 x 5 x 3	90(Z) or (S)	50(S) or (Z)	NO	90 ± 10	66	15600	C
SC 715	AH 244	12 + 12	12(S) + 12(Z)	940 x 6 x 3	90(S) or (Z)	80(Z) or (S)	NO	200 ± 40	62	17800	A

For SC 701 and SC 711 the interlaced yarns are Z and S twist (i.e. all yarns in the same direction of working have the same twist direction)

NOTES

- (1) Singles turns per metre are negligible (less than 25 turns/metre) for yarns labelled "No Added Twist"
- (2) Twist tolerances: first time ± 10%
second time ± 15%

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