BS EN 4199-003:2014

BSI Standards Publication

Aerospace series — Bonding straps for aircraft

Part 003: Bonding strap assemblies with flat braided conductor copper, tin plated — 65 °C up to 150 °C and copper, nickel plated — 65 °C up to 260 °C — Product standard

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National foreword

This British Standard is the UK implementation of EN 4199-003:2014. It supersedes BS EN 4199-003:2009 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ACE/6, Aerospace avionic electrical and fibre optic technology.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Luft- und Raumfahrt - Masseverbinder für Luftfahrzeuge - Teil 003: Masseverbinder, konfektioniert, flache Geflechtleiter Kupfer, verzinnt - 65 °C bis 150 °C und Kupfer, vernickelt - 65 °C bis 260 °C - Produktnorm

This European Standard was approved by CEN on 12 October 2013.

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Foreword

This document (EN 4199-003:2014) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2014, and conflicting national standards shall be withdrawn at the latest by month year of October 2014.

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1 Scope

This European Standard defines the characteristics of bonding straps with flat braided copper conductors tin or nickel plated and terminal lugs tin or nickel plated, crimped on both ends for use on aircraft. This standard shall be used together with EN 4199-001.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 2424, *Aerospace series - Marking of aerospace products*

EN 3373-001, *Aerospace series - Terminal lugs and in-line splices for crimping on electric conductors - Part 001: Technical specification*

EN 4199-001, *Aerospace series - Bonding straps for aircraft - Part 001: Technical specification*

EN 4199-005, *Aerospace series - Bonding straps for aircraft - Part 005: Flat braid conductors copper, tin plated -65 °C up to 150 °C and copper, nickel plated, -65 °C up to 260 °C - Product standard*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 4199-001 apply.

4 Characteristics

4.1 Temperature rating

Flat braid copper conductors for bonding straps.

Tin plated copper braid conductor and tin plated copper terminal lugs − 65 °C up to 150 °C.

Nickel plated copper braid conductor and nickel plated copper terminal lugs − 65 °C up to 260 °C.

4.2 Material and finish

For flat braid copper conductor, see EN 4199-005.

Flat braid copper conductor and terminal lugs shall have the same finish.

The finish shall be either tin or nickel using the designation 'T' or 'N'. See designation in Clause 7.

4.3 Length restrictions

For the electrical bonding of structural elements likely to conduct lightening, braids longer than 220 mm are not generally approved and should not be used without the prior consent of the departments dealing with system studies and standardisation.

When using bonding straps on equipment or installations generating or processing frequencies greater than 100 kHz, care shall be taken not to exceed a length to width ratio of 5 to 1 for reasons of electromagnetic compatibility.

4.4 Cross sectional area

The nominal cross sectional area, plus the associated test currents and tensile strength requirements of the straps shall be in accordance with Table 1. Test currents and tensile strength figures are derived from EN 3373-001 Table 2.

Table 1 — Cross sectional area

Cross section code	Nominal braid cross sectional area mm^2	Test current Amps	Tensile strength lug to lug N
A	04	50	> 600
B	06	60	> 800
C	10	80	> 1 200
D	16	110	> 1 700
E	25	150	> 2 200

5 Dimensions, mass and resistance

5.1 General

Dimensions and tolerances are in millimetres.

For length 'L' and tolerances, see 5.2.

For nominal braid width, see Table 3 and EN 4199-005.

For mass and resistance, see Table 3.

For 'd max.' see Table 2.

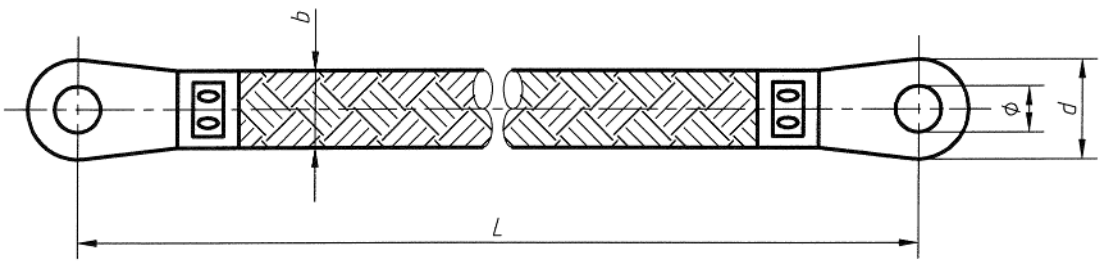


Figure 1

5.2 Length

Length shall be defined as the measurement between terminal hole centres as shown in Figure 1. Standard lengths shall be called up in multiples of 25 mm. Preferred lengths shall range from 50 mm up to 300 mm. Longer, non-preferred lengths are allowable as long as they are approved by the relevant design authority. A three or four digit length code is to be entered into the designation (see Clause 7).

The following standard tolerances to length shall apply:

— $^{+5}_{0}$ mm for lengths up to 100 mm;

— $^{+10}_{0}$ mm for lengths 125 mm to 975 mm;

— $^{+25}_{0}$ mm for lengths of 1 000 mm and above.

Nominal resistance and mass values for straps of 100 mm length are shown in Table 3.

5.3 Terminal selection

Terminal variant availability is in accordance with Table 2.

Only aerospace approved terminals shall be used.

Table 2 — Terminal selection

			Cross sectional area – Terminal availability				
Terminal variant code	**Stud/Hole size**	**Hole Ø** mm	**4**	**6**	**10**	**16**	**25**
A	No. 8	**4,34**	√	√	X	X	X
B	No. 10	**5,00**	√	√	√	X	X
C	1/4	**6,73**	√	√	√	√	X
D	5/16	8,33	√	√	√	√	X
E	3/8	9,91	X	X	X	√	√
Terminal barrel size		AWG	12/10	8	6	4	2
d max. (see Figure 1)		mm	**13,8**	**14,6**	**16,2**	**16,2**	**16,2**

5.4 Mass and resistance

See Table 3.

Table 3 — Mass and resistance

Braid x-section mm^2	**Nominal braid width** mm	**Nominal resistance 100 mm strap** mΩ	**Braid resistance** mΩ per 25 mm	**Nominal mass 100 mm strap** g	**Braid mass** g per 25 mm
4	8,2	0,4	0,112	6,3	1,1
6	10,0	0,24	0,075	10,7	1,63
10	14,0	0,14	0,046	18,4	2,9
16	17,5	0,09	0,03	28,9	3,93
25	21,0	0,06	0,015	43,2	7,85

The figures shown in Table 3 are for nickel plated straps. For tin plated straps, resistance figures will be slightly lower. Mass figures will be comparable.

For lengths other than 100m m, nominal resistance and mass can be calculated by adding or subtracting multiples of the 25 mm braid figures quoted in Table 3.

EXAMPLE 1 Resistance for a 10 mm^2.

250 mm long strap = 0,14 mΩ + (6 × 0,046) mΩ = 0,416 mΩ total nominal resistance.

EXAMPLE 2 Mass for a 4 mm^2.

50 mm long strap = 6,3 g − 1,1 g = 5,2 g total nominal mass.

For maximum figures, an additional 10 % should be applied to the nominal values.

Nominal values of mass are based on the use of typical terminals for each x-sectional area.

6 Quality assurance

6.1 Qualification

See EN 4199-001, 7.2.

Number of cycles for mechanical fatigue shall be 50 000 cycles.

6.2 Acceptance Tests

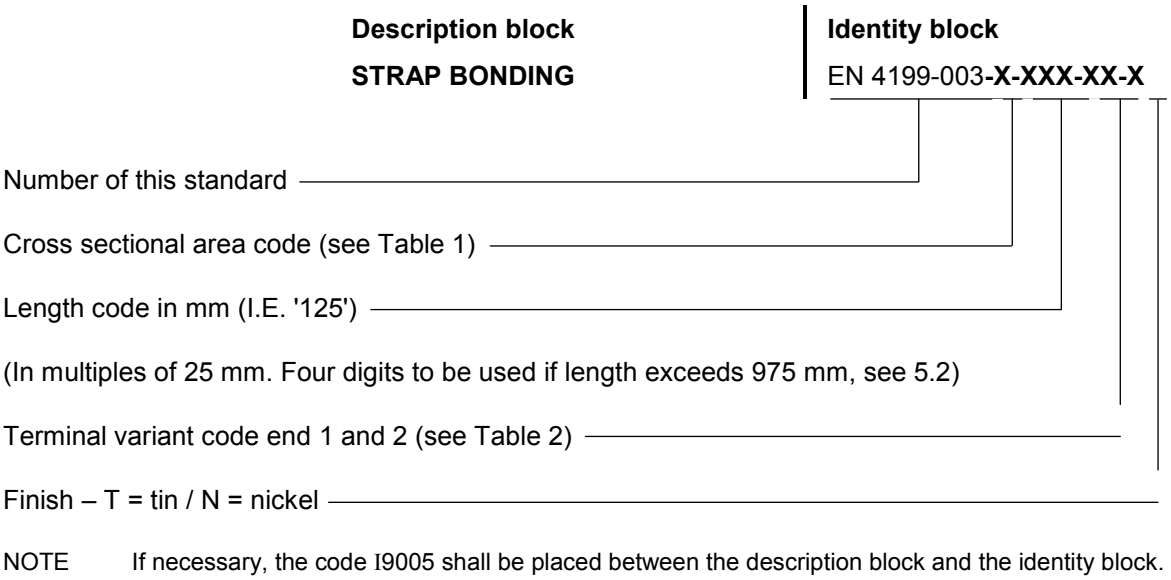
See EN 4199-001, 7.4, Table 7.

Test currents shall be in accordance with Table 1 above. Resistance and mass shall be in accordance with Table 3 above.

Resistance is calculated from the millivolt drop readings measured from terminal palm to terminal palm using the method specified in EN 4199-001, see 6.3. All measurements shall be taken at an ambient temperature of (20 ± 5) °C.

7 Designation

EXAMPLE



NOTE If necessary, the code I9005 shall be placed between the description block and the identity block.

8 Marking

The marking of the bonding strap by label on the packaging shall include:

— the designation as defined in this product standard;

— date of manufacture;

— the manufacturers name or monogram in accordance with EN 2424, style F.

9 Packaging

Bonding straps shall be packed so as to avoid any damage.

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