



# SLOVENSKI STANDARD

## SIST EN 4199-001:2014

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SIST EN 4199-001:2009

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**Aeronavtika - Ozemljitvene zbiranke za letala - 001. del: Tehnična specifikacija**

Aerospace series - Bonding straps for aircraft - Part 001: Technical specification

Luft- und Raumfahrt - Masseverbinder für Luftfahrzeuge - Teil 001: Technische Lieferbedingungen

Série aéronautique - Tresses de métallisation pour avion - Partie 001: Spécification technique

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**Ta slovenski standard je istoveten z EN 4199-001:2013**

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**ICS:**

49.060

Letalska in vesoljska  
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Aerospace electric  
equipment and systems

**SIST EN 4199-001:2014**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 4199-001**

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ICS 49.060

Supersedes EN 4199-001:2006

English Version

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

Série aérospatiale - Tresses de métallisation pour avion -  
Partie 001: Spécification technique

Luft- und Raumfahrt - Masseverbinder für Luftfahrzeuge -  
Teil 001: Technische Lieferbedingungen

This European Standard was approved by CEN on 3 November 2012.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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## Foreword

This document (EN 4199-001:2013) 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 July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 4199-001:2006.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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**EN 4199-001:2013 (E)****1 Scope**

This European Standard specifies the general characteristics of bonding straps with flat or round braided copper conductor, and terminal lugs, crimped on both ends, for use on aircraft.

**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 2591 (all parts), *Aerospace series — Elements of electrical and optical connection — Test methods*

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

EN 3475 (all parts), *Aerospace series — Cables, electrical, aircraft use — Test methods*

EN 9133, *Aerospace series — Quality management systems — Qualification procedure for aerospace standard parts*

IEC 60050-581, *International Electrotechnical Vocabulary — Part 581: Electromechanical components for electronic equipment* <sup>1)</sup>

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**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in IEC 60050-581 and the following apply.

- a flat or round braided copper conductor, tin or nickel plated;
- crimped on terminal lugs at both ends.

**4 Required characteristics****4.1 General**

See product standard.

**4.2 Temperature range**

See Table 1.

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<sup>1)</sup> Published by: IEC International Electrotechnical Commission <http://www.iec.ch/>.

Table 1

Class	Temperature range	Material/finish
T	– 65 °C to 150 °C	Tin plated copper braided conductor and tin plated copper terminal lugs
N	– 65 °C to 260 °C	Nickel plated copper braided conductor and nickel plated copper terminal lugs

### 4.3 Material

Materials shall be suitable for the intended use and as specified in the product standard.

### 4.4 Finish

See product standard.

### 4.5 Dimensions and mass

See product standard.

## 5 Design

Bonding straps for aircraft shall be designed and assembled in a careful and competent manner so as to withstand normal handling during installation and maintenance in service. In order to achieve good reliable crimped connections the correct crimping tool shall be used.

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 five to one for reasons of electromagnetic compatibility.

## 6 Tests

### 6.1 Tests on the braids

The tests of EN 3475 listed in Table 2 shall be applicable for testing of round and flat braid conductors used in the construction of bonding straps.

Table 2

EN 3475-	Designation of the test	Details
201	Visual examination	No visible deformations.
202	Mass	Mass, shall be carried out on each batch of material.
203	Dimensions	Including correct braid angle when applicable see product standard.
301	Ohmic resistance per unit length	Table, see product standard.
512	Flexure endurance	As specified in the product standard.

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## 6.2 Tests on the bonding strap assemblies

The tests of EN 2591, applicable in the context of this standard as well as the details necessary for implementing them and for inspecting bonding straps are given in Table 3 of this standard.

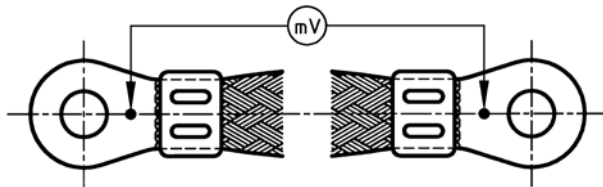
Table 3

EN 2591-	Designation of the test	Details
101	Visual examination	Initial examined details to be examined: — identification of materials in accordance with product standard; — identification; — appearance; — marking; — surface finish; — final examination.
102	Examination of dimensions and mass	As defined in product standard.
218	Ageing of terminal lugs and in-line splices by temperature and current cycling	Test current and initial voltage drop as specified in product standard. Maximum deviation at end of test shall not exceed that specified in EN 2591-218.
301	Endurance at temperature	Method B 20 h in dry heat at temperature of $(150 \pm 5) ^\circ\text{C}$ for tin plated or $(260 \pm 5) ^\circ\text{C}$ for nickel plated bonding straps. No deviation from tensile strength listed in this standard and from maximum permissible voltage drop specified in the appropriate product standard.
305	Rapid change of temperature	Temperature cycles: Five cycles after variations – $65 ^\circ\text{C}$ to $150 ^\circ\text{C}$ for tin plated, – $65 ^\circ\text{C}$ to $260 ^\circ\text{C}$ for nickel plated bonding straps. No deviation from tensile strength listed in this standard and from maximum permissible voltage drop specified in the appropriate product standard.
307	Salt mist	48 h or as specified in the product standard. No deviation from maximum permissible voltage drop specified in the appropriate product standard
403	Sinusoidal and random vibration	Not applicable
417	Tensile strength (crimped connection)	EN 3373-001, terminal lugs on both ends. The specimen shall not break at a value less than that specified in the product standard.

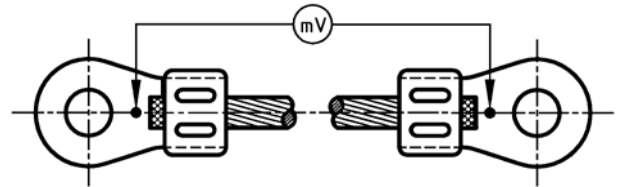


### 6.3 Ohmic resistance

The ohmic resistance and test current values for complete bonding strap assemblies shall be defined in the product standard. The resistance shall be calculated from the voltage drop readings measured in accordance with Figure 1 or Figure 2 at  $(20 \pm 3) ^\circ\text{C}$ .



**Figure 1 — Bonding straps with flat braid conductor**



**Figure 2 — Bonding straps with round braid conductor**

### 6.4 Mechanical fatigue test

Specimens shall be bonding straps assembled with a terminal at each end, the dimension between the stud holes being 250 mm centre to centre.

The specimen shall be mounted on the test apparatus as shown in Figure 3, the axis of the terminal lugs passing through the pivot point of the apparatus.

One test cycle shall consist of one flex to  $50^\circ$  upwards, return to neutral position followed by flex to  $50^\circ$  downwards and then return to the neutral, starting, position.

The specimen shall be flexed for the number of cycles detailed in the product standard. A visual examination and test 6.3 shall be performed after the required number of cycles has been completed. Failure of the specimen is deemed to be a complete fracture or when the resistance reading exceeds the specified requirement by more than 20 %.

The results shall be reported.