

# **SLOVENSKI STANDARD**

## **SIST EN 2713-004:2009**

**01-junij-2009**

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**Aeronavtika - Eno- ali vel' h'lni elektril' ni kabli za splošno uporabo - Delovne temperature med 55 °C in 200 °C - 004. del: Oklopljeni (opleteni) in oplađ' eni, z moĥnostjo brizganega tiskanja - Standard za proizvod**

Aerospace series - Cables, electrical, single and multicore for general purpose - Operating temperatures between - 55 °C and 200 °C - Part 004: Screened (braided) and jacketed, ink jet printable - Product standard

Luft- und Raumfahrt - Leitungen, elektrisch, ein- und mehradrig, für allgemeine Verwendung - Betriebstemperaturen zwischen 55 °C und 200 °C - Teil 004: Geschirmt (Umflechtung) und ummantelt, tintenstrahl-bedruckbar - Produktnorm

Série aérospatiale - Câbles, électriques, mono et multiconducteurs d'usage général - Températures de fonctionnement comprises entre - 55 °C et 200 °C - Partie 004 : Blindés (tressés) et gainés, marquables au jet d'encre - Norme de produit

**Ta slovenski standard je istoveten z: EN 2713-004:2006**

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**ICS:**

49.060

Letalska in vesoljska  
elektril' na oprema in sistemi

Aerospace electric  
equipment and systems

**SIST EN 2713-004:2009**

**en,de**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 2713-004**

August 2006

ICS 49.060

English Version

**Aerospace series - Cables, electrical, single and multicore for  
general purpose - Operating temperatures between - 55 °C and  
200 °C - Part 004: Screened (braided) and jacketed, ink jet  
printable - Product standard**

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Betriebstemperaturen zwischen - 55 °C und 200 °C - Teil  
004: Geschirmt (Umflechtung) und ummantelt, Tintenstrahl  
bedruckbar - Produktnorm

This European Standard was approved by CEN on 19 May 2006.

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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 Central Secretariat has the same status as the official versions.

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## Foreword

This European Standard (EN 2713-004:2006) 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 February 2007, and conflicting national standards shall be withdrawn at the latest by February 2007.

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.

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**EN 2713-004:2006 (E)****1 Scope**

This standard specifies the characteristics of ink jet printable, single and multicore screened (braided) and jacketed electrical cables for use in the on-board electrical systems of aircraft, at operating temperatures between – 55 °C and 200 °C.

It shall also be possible to mark these cables by hot stamp printing.

These markings shall be in accordance with EN 3838.

This standard is not valid for new study.

**2 Normative references**

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

EN 2083, *Aerospace series — Copper or copper alloy conductors for electrical cables — Product standard.*

EN 2235, *Aerospace series — Single and multicore electrical cables, screened and jacketed — Technical specification.*

EN 2266-003, *Aerospace series — Cables, electrical, for general purpose — Operating temperatures between – 55 °C and 200 °C — Part 003: Ink jet printable — Product standard.*

EN 2713-002, *Aerospace series — Cables, electrical, single and multicore for general purpose — Operating temperatures between – 55 °C and 200 °C — Part 002: Screened and jacketed — General.*

EN 3475-100\*, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 100: General.*

EN 3838, *Aerospace series — Requirements and tests on user-applied markings on aircraft electrical cables.* <sup>1)</sup>

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

**3 Terms and definitions**

For the purposes of this standard, the terms and definitions given in EN 3475-100 apply.

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\* And all parts quoted in Table 2.

1) Published as AECMA Prestandard at the date of publication of this standard.

## 4 Materials and construction

### 4.1 Materials

These cables shall consist of the following:

- cores according to EN 2266-003, top coat dispersion fluorocarbon;
- number of cores 1 to 4.

2 to 4-core cables shall be spiral screened twisted together according to EN 2235.

Filler cores shall not be permitted.

#### Screen:

- nickel-plated copper stranded braid;
- for dimensions of strands, see Table 1;
- material according to EN 2083, tests according to EN 3475-100;
- construction according to EN 2235.

#### Outer jacket:

- layer of polyimide with total wall thickness (nominal value) of 30 µm, coated on both sides with a layer 2,5 µm thick of fluorocarbon;
- direction of winding immaterial, overlap 67% min. or two layers - winding direction of first immaterial, overlap 51 % min. and second layer in opposite direction with 20 % min. overlap;
- top coat of dispersion fluorocarbon, wall thickness 15 µm min. including the necessary additives for the acceptance of user-applied ink jet marking.

### 4.2 Construction

See EN 2083 and Table 1.

## EN 2713-004:2006 (E)

Table 1

| Number of cores                                                                                                           | Code for nominal section | Nominal section | AWG <sup>a</sup> | Linear resistance at 20 °C | Screen strands nominal diameter | External diameter | Mass  |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------|------------------|----------------------------|---------------------------------|-------------------|-------|
|                                                                                                                           |                          | mm <sup>2</sup> |                  | max.<br>Ω/km               |                                 | max.<br>mm        |       |
| 1                                                                                                                         | 001                      | 0,15            | 26               | 160,0                      | 0,08                            | 1,45              | 5,2   |
|                                                                                                                           | 002                      | 0,25            | 24               | 114,0                      | 0,08                            | 1,55              | 6,2   |
|                                                                                                                           | 004                      | 0,4             | 22               | 60,0                       | 0,10                            | 1,76              | 8,7   |
|                                                                                                                           | 006                      | 0,6             | 20               | 33,2                       | 0,10                            | 2,04              | 12,5  |
|                                                                                                                           | 010                      | 1               | 18               | 21,1                       | 0,10                            | 2,29              | 16,7  |
|                                                                                                                           | 012                      | 1,2             | 16               | 14,5                       | 0,10                            | 2,55              | 21,7  |
|                                                                                                                           | 020                      | 2               | 14               | 10,9                       | 0,10                            | 2,80              | 27,3  |
|                                                                                                                           | 030                      | 3               | 12               | 6,8                        | 0,10                            | 3,35              | 40,4  |
|                                                                                                                           | 050                      | 5               | 10               | 4,2                        | 0,12                            | 4,05              | 63,8  |
|                                                                                                                           | 051 <sup>b</sup>         | 5               | 10               | 4,1                        | 0,12                            | 4,20              | 66,0  |
| 2                                                                                                                         | 001                      | 0,15            | 26               | 165,00                     | 0,10                            | 2,34              | 10,1  |
|                                                                                                                           | 002                      | 0,25            | 24               | 117,00                     | 0,10                            | 2,54              | 12,0  |
|                                                                                                                           | 004                      | 0,4             | 22               | 61,70                      | 0,10                            | 2,84              | 15,5  |
|                                                                                                                           | 006                      | 0,6             | 20               | 34,10                      | 0,10                            | 3,38              | 22,5  |
|                                                                                                                           | 010                      | 1               | 18               | 21,70                      | 0,10                            | 3,90              | 31,3  |
|                                                                                                                           | 012                      | 1,2             | 16               | 14,90                      | 0,12                            | 4,50              | 43,0  |
|                                                                                                                           | 020                      | 2               | 14               | 11,20                      | 0,12                            | 5,04              | 55,3  |
|                                                                                                                           | 030                      | 3               | 12               | 6,99                       | 0,15                            | 6,11              | 84,7  |
|                                                                                                                           | 050                      | 5               | 10               | 4,32                       | 0,15                            | 7,50              | 126,0 |
|                                                                                                                           | 051 <sup>b</sup>         | 5               | 10               | 4,22                       | 0,15                            | 7,60              | 131,0 |
| 3                                                                                                                         | 001                      | 0,15            | 26               | 165,00                     | 0,10                            | 2,49              | 13,2  |
|                                                                                                                           | 002                      | 0,25            | 24               | 117,00                     | 0,10                            | 2,70              | 15,9  |
|                                                                                                                           | 004                      | 0,4             | 22               | 61,70                      | 0,10                            | 3,05              | 21,0  |
|                                                                                                                           | 006                      | 0,6             | 20               | 34,10                      | 0,10                            | 3,61              | 31,3  |
|                                                                                                                           | 010                      | 1               | 18               | 21,70                      | 0,12                            | 4,21              | 45,6  |
|                                                                                                                           | 012                      | 1,2             | 16               | 14,90                      | 0,12                            | 4,79              | 60,6  |
|                                                                                                                           | 020                      | 2               | 14               | 11,20                      | 0,12                            | 5,34              | 77,0  |
|                                                                                                                           | 030                      | 3               | 12               | 6,99                       | 0,15                            | 6,60              | 122,0 |
|                                                                                                                           |                          |                 |                  |                            |                                 |                   |       |
| 4                                                                                                                         | 001                      | 0,15            | 26               | 165,0                      | 0,10                            | 2,71              | 15,8  |
|                                                                                                                           | 002                      | 0,25            | 24               | 117,0                      | 0,10                            | 2,93              | 19,5  |
|                                                                                                                           | 004                      | 0,4             | 22               | 61,7                       | 0,10                            | 3,31              | 26,0  |
|                                                                                                                           | 006                      | 0,6             | 20               | 34,1                       | 0,12                            | 4,00              | 41,2  |
|                                                                                                                           | 010                      | 1               | 18               | 21,7                       | 0,12                            | 4,61              | 57,0  |
|                                                                                                                           | 012                      | 1,2             | 16               | 14,9                       | 0,12                            | 5,22              | 75,6  |
|                                                                                                                           | 020                      | 2               | 14               | 11,2                       | 0,15                            | 6,00              | 102,4 |
| <sup>a</sup> AWG = Closest American Wire Gage.<br><sup>b</sup> Flexible construction which may be used as an alternative. |                          |                 |                  |                            |                                 |                   |       |

## 4.3 Colour coding of cores and jacket

See EN 2713-002.

## 5 Required characteristics

According to EN 2235 and EN 3475-100.

See Table 2.

Table 2

| EN 3475- | Designation of the test          | Details                                                                                                                          |
|----------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| 201      | Visual examination               | Applicable                                                                                                                       |
| 202      | Mass                             | Applicable; see Table 1.                                                                                                         |
| 203      | Dimensions                       | Applicable; see Table 1.                                                                                                         |
| 301      | Ohmic resistance per unit length | Applicable; see Table 1.                                                                                                         |
| 302      | Voltage proof test               | Applicable                                                                                                                       |
| 303      | Insulation resistance            | Applicable                                                                                                                       |
| 304      | Surface resistance               | Applicable                                                                                                                       |
| 305      | Overload resistance              | Not applicable                                                                                                                   |
| 401      | Accelerated ageing               | Applicable<br>Temperature (250 ± 5) °C                                                                                           |
| 402      | Shrinkage and delamination       | Applicable<br>Temperature (250 ± 5) °C<br>Maximum shrinkage at each end of cable: jacket 2 mm, core insulation, see EN 2266-003. |
| 403      | Delamination and blocking        | Applicable<br>Temperature (250 ± 5) °C                                                                                           |
| 404      | Thermal shock                    | Applicable<br>Temperature (250 ± 5) °C<br>Maximum shrinkage at each end of cable: jacket 2 mm, core insulation, see EN 2266-003. |
| 405      | Bending at ambient temperature   | Applicable                                                                                                                       |
| 406      | Cold bend test                   | Applicable                                                                                                                       |
| 407      | Flammability                     | Applicable<br>Extinguishing time: 3 s max.                                                                                       |
| 408      | Fire resistance                  | Not applicable                                                                                                                   |
| 409      | Air-excluded ageing              | Not applicable                                                                                                                   |
| 410      | Thermal endurance                | Applicable<br>40 000 h (temperature 200 °C)                                                                                      |
| 411      | Resistance to fluids             | Applicable                                                                                                                       |
| 501      | Dynamic cut-through              | Not applicable                                                                                                                   |
| 502      | Notch propagation                | Applicable<br>Notch depth: 40 µm                                                                                                 |

continued