



# SLOVENSKI STANDARD SIST EN 2713-009:2009

01-junij-2009

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Aerospace series - Cables, electrical, single and multicore for general purpose -  
Operating temperatures between - 55 °C and 200 °C - Part 009: Screened (spiral) and  
jacketed, YAG X3 laser printable - Product standard

**STANDARD PREVIEW**

Luft- und Raumfahrt - Leitungen, elektrisch, ein- und mehradrig, für allgemeine  
Verwendung - Teil 009: Geschirmt (Umschilung) und ummantelt, YAG X3-Laser-  
bedruckbar - Produktnorm

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Série aérospatiale - Câbles, électriques, mono et multiconducteurs d'usage général -  
Températures de fonctionnement comprises entre - 55 °C et 200 °C - Partie 009 :  
Blindés (guipés) et gainés, marquables au laser YAG X3 - Norme de produit

**Ta slovenski standard je istoveten z: EN 2713-009:2006**

**ICS:**

49.060 Š^cp \ aš Ā^• [ |b \ æ Aerospace electric  
^|\ dā} a] !^ { aš Ā ā c { ā equipment and systems

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 2713-009**

July 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 009: Screened (spiral) and jacketed, YAG X3 laser  
printable - Product standard**

Série aérospatiale - Câbles, électriques, mono et  
multiconducteurs d'usage général - Températures de  
fonctionnement comprises entre - 55 °C et 200 °C - Partie  
009 : Blindés (guipés) et gainés, marquables au laser YAG  
X3 - Norme de produit

Luft- und Raumfahrt - Leitungen, elektrisch, ein- und  
mehradrig, für allgemeine Verwendung -  
Betriebstemperaturen zwischen - 55 °C und 200 °C - Teil  
009: Geschirmt (Umseilung) und ummantelt, YAG X3 Laser  
bedruckbar - Produktnorm

This European Standard was approved by CEN on 27 April 2006.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

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## Foreword

This European Standard (EN 2713-009:2006) has been prepared by the European Association of Aerospace Manufacturers - Standardization (AECMA-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 AECMA, 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 January 2007, and conflicting national standards shall be withdrawn at the latest by January 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.

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

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**EN 2713-009:2006 (E)****1 Scope**

This standard specifies the characteristics of YAG X3 laser printable, single and multicore screened (spiral) 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 or ink jet printing.

These markings shall be in accordance with EN 3838.

**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 European Standard, the terms and definitions given in EN 3475-100 apply.

**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 twisted together according to EN 2235.

\* And all its parts quoted in Table 2.

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

Filler cores shall not be permitted.

**Screen:**

- nickel-plated copper stranded spiral screen;
- 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 YAG X3 laser marking.

**4.2 Construction**

See EN 2083 and Table 1.

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## EN 2713-009:2006 (E)

Table 1

Number of cores	Code for nominal section	Nominal section mm <sup>2</sup>	AWG <sup>a</sup>	Linear resistance at 20 °C	Screen strands nominal diameter mm	External diameter	Mass
				max. Ω/km		max. mm	max. kg/km
1	001	0,15	26	160,0	0,08	1,31	4,6
	002	0,25	24	114,0	0,08	1,40	5,6
	004	0,4	22	60,0	0,08	1,56	7,2
	006	0,6	20	33,2	0,08	1,82	10,5
	010	1	18	21,1	0,08	2,07	14,4
	012	1,2	16	14,5	0,10	2,38	20,0
	020	2	14	10,9	0,10	2,62	25,4
	030	3	12	6,8	0,10	3,17	38,5
	050	5	10	4,2	0,12	3,87	61,0
	051 <sup>b</sup>	5	10	4,1	0,12	3,92	63,7
2	001	0,15	26	165,00	0,08	2,15	8,0
	002	0,25	24	117,00	0,08	2,34	10,0
	004	0,4	22	61,70	0,08	2,65	13,1
	006	0,6	20	34,10	0,10	3,20	20,6
	010	1	18	21,70	0,10	3,73	28,5
	012	1,2	16	14,90	0,12	4,25	39,5
	020	2	14	11,20	0,12	4,83	50,5
	030	3	12	6,99	0,15	5,88	79,4
	050	5	10	4,32	0,20	7,28	128,2
	051 <sup>b</sup>	5	10	4,22	0,20	7,40	132,3
3	001	0,15	26	165,00	0,08	2,28	10,8
	002	0,25	24	117,00	0,10	2,52	14,2
	004	0,4	22	61,70	0,10	2,88	19,0
	006	0,6	20	34,10	0,12	3,48	29,5
	010	1	18	21,70	0,12	4,04	41,8
	012	1,2	16	14,90	0,12	4,59	56,1
	020	2	14	11,20	0,15	5,15	75,1
	030	3	12	6,99	0,20	6,35	119,8
4	001	0,15	26	165,0	0,10	2,53	14,2
	002	0,25	24	117,0	0,10	2,76	17,7
	004	0,4	22	61,7	0,10	3,13	24,0
	006	0,6	20	34,1	0,12	3,78	38,1
	010	1	18	21,7	0,12	4,48	53,4
	012	1,2	16	14,9	0,15	5,13	75,0
	020	2	14	11,2	0,20	5,84	102,0

<sup>a</sup> AWG = Closest American Wire Gage

<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 Temperature (250 ± 5) °C
402	Shrinkage and delamination	Applicable Temperature (250 ± 5) °C Maximum shrinkage at each end of cable: jacket 2 mm, core insulation, see EN 2266-003.
403	Delamination and blocking	Applicable Temperature (250 ± 5) °C
404	Thermal shock	Applicable Temperature (250 ± 5) °C 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 Extinguishing time: 3 s max.
408	Fire resistance	Not applicable
409	Air-excluded ageing	Not applicable
410	Thermal endurance	Applicable 40 000 h (temperature 200 °C)
411	Resistance to fluids	Applicable
501	Dynamic cut-through	Not applicable
502	Notch propagation	Applicable Notch depth: 40 µm

continued