



# SLOVENSKI STANDARD SIST EN 2346-004:2009

01-februar-2009

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Aerospace series - Cable, electrical, fire resistant - Operating temperatures between - 65 C and 260 C - Part 004: DN family, single UV laser printable and multicore assembly - Light weight - Product standard

**iTeh STANDARD PREVIEW**

Luft- und Raumfahrt - Feuerbeständige elektrische Leitungen - Betriebstemperaturen zwischen - 65 C und 260 C - Teil 004: DN-Familie, ein- und mehradrige Leitungen UV-laser-bedruckbar - Gewichtsoptimiert - Produktnorm

[SIST EN 2346-004:2009](https://standards.iteh.ai/catalog/standards/sist/16bf854e-297e-4cd7-aa9a-410e4e310101/en-2346-004-2009)

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Série aérospatiale - Câbles électriques résistants au feu - Températures de fonctionnement comprises entre - 65 C et 260 C - Partie 004 : Famille DN, fil simple marquable au laser UV et éléments assemblés - Version allégée - Norme de produit

**Ta slovenski standard je istoveten z: EN 2346-004:2006**

**ICS:**

49.060 Š^c^ \ æš Á^•[ |b \ æ Aerospace electric  
^|\ dã} æ] !^ { æš Á ã c { ã equipment and systems

**SIST EN 2346-004:2009 en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 2346-004**

June 2006

ICS 49.060

English Version

**Aerospace series - Cable, electrical, fire resistant - Operating temperatures between - 65 °C and 260 °C - Part 004: DN family, single UV laser printable and multicore assembly - Light weight - Product standard**

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Luft- und Raumfahrt - Feuerbeständige elektrische  
Leitungen - Betriebstemperaturen zwischen - 65 °C und  
260 °C - Teil 004: DN-Familie, ein- und mehradrige  
Leitungen UV-laser bedruckbar - Gewichtsoptimiert -  
Produktnorm

This European Standard was approved by CEN on 3 February 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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## Foreword

This European Standard (EN 2346-004:2006) 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 December 2006, and conflicting national standards shall be withdrawn at the latest by December 2006.

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 2346-004:2006 (E)****1 Scope**

This standard specifies the characteristics of lightweight fire resistant, unscreened, electrical cables for use in the on-board electrical systems of aircraft at operating temperature between – 65 °C and 260 °C.

Single core is UV laser printable in accordance with EN 3838; UV laser markability is not mandatory for multicore cables.

**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.

IEC 28:1925, *International standard of resistance for copper.*

EN 2234, *Aerospace series – Cable, electrical, fire resistant – Technical specification.* <sup>1)</sup>

EN 2346-002, *Aerospace series – Cable, electrical, fire resistant – Operating temperatures between – 65 °C and 260 °C – Part 002: 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 4608-001, *Aerospace series – Cable, electrical, fire resistant – Single and twisted multicore assembly, screened (braided) and jacketed – Operating temperatures between – 65 °C and 260 °C – Part 001: Technical specification.*

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.

**4 Materials and construction****4.1 Materials****4.1.1 Conductors**

Individual strands used for the conductors shall be cylindrical and shall be:

- of nickel clad copper alloy for nominal cross sections of 0,4 mm<sup>2</sup> (code 004);
- of nickel clad copper for nominal cross sections ≥ 0,6 mm<sup>2</sup> (codes ≥ 006).

The copper shall meet the requirements of IEC 28 and the copper alloy the requirements of EN 2234.

\* And all parts quoted in this standard.

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

#### 4.1.2 Insulation

The insulation shall comply with the requirements of EN 2234.

#### 4.2 Construction

See Table 1.

Table 1

No of core	Code number	Nominal cross section mm <sup>2</sup>	AWG <sup>a</sup>	Number of strands	Nominal diameter of strands mm	Conductive resistance at 20 °C Ω/km max.	Conductor diameter mm max.	External diameter		Mass g/m max.	Number of missing strands
								mm min.	mm max.		
1	004	0,4	22	19	0,15	80,90	0,80	1,60	1,75	6,8	0
	006	0,6	20	19	0,20	44,30	1,04	1,83	2,00	9,9	0
	010	1,0	18	19	0,25	27,90	1,29	2,06	2,25	13,7	0
	012	1,2	16	19	0,30	18,80	1,53	2,29	2,60	18,9	0
	020	2,0	14	37	0,25	13,90	1,82	2,77	3,10	25,9	0
2	004	0,4	22	19	0,15	82,5	0,80	3,36	3,50	14,2	0
	006	0,6	20	19	0,20	45,2	1,04	3,84	4,00	20,5	0
	010	1,0	18	19	0,25	28,5	1,29	4,34	4,60	28,5	0
	012	1,2	16	19	0,30	19,2	1,53	4,82	5,10	37,7	0
	020	2,0	14	37	0,25	14,2	1,82	5,82	6,10	52,8	0
3	004	0,4	22	19	0,15	82,5	0,80	3,61	3,80	21,2	0
	006	0,6	20	19	0,20	45,2	1,04	4,13	4,40	30,8	0
	010	1,0	18	19	0,25	28,5	1,29	4,67	4,90	42,8	0
	012	1,2	16	19	0,30	19,2	1,53	5,18	5,50	56,5	0
	020	2,0	14	37	0,25	14,2	1,82	6,26	6,60	79,1	0

<sup>a</sup> Closest American Wire Gauge

#### 4.3 Colour code

See EN 2346-002.

#### 4.4 Number of cores

See EN 2346-002.

See EN 4608-001 for assembly.

#### 5 Required characteristics

See EN 2234 and Table 2.

- operating temperature: 260 °C max. continuous
- operating voltage: 600 V<sub>AC</sub>
- use frequency: 2 000 Hz max.

## EN 2346-004:2006 (E)

## 6 Tests

See Table 2.

Table 2

EN 3475-	Designation of the test	Remarks
201	Visual examination	Applicable.
202	Mass	Applicable Table 1.
203	Dimensions	Applicable Table 1.
301	Ohmic resistance per unit length	Applicable Table 1.
302	Voltage proof test – Immersion test	Applicable EN 2234.
302	Voltage proof test – Dry spark test	Applicable EN 2234.
303	Insulation resistance	Applicable EN 2234.
304	Surface resistance	Applicable EN 2234.
305	Overload resistance	Applicable to code 006 EN 2234. $T_1 = (310 \pm 5) ^\circ\text{C}$ . $T_2 = (450 \pm 5) ^\circ\text{C}$ .
306	Continuity of conductors	Applicable.
401	Accelerated ageing	Applicable EN 2234. Temperature: $(310 \pm 5) ^\circ\text{C}$ .
402	Shrinkage and delamination	Applicable. Temperature: $(310 \pm 5) ^\circ\text{C}$ . Maximum shrinkage: 1,5 mm.
403	Delamination and blocking	Applicable EN 2234. Temperature: $(310 \pm 5) ^\circ\text{C}$ .
404	Thermal shock	Applicable EN 2234. Temperature: $260 ^\circ\text{C}$ . Max. shrinkage 1,5 mm.
405	Bending at ambient temperature	Applicable EN 2234.
406	Cold bend test	Applicable EN 2234. Temperature: $(- 55 \pm 2) ^\circ\text{C}$ .
407	Flammability – Method 1	Applicable EN 2234. Extinction time: 3 s.
408	Fire resistance	Applicable, load 170 g for code 004 and 340 g for codes $\geq 006$ .
409	Air-excluded ageing	Applicable. Temperature: $(180 \pm 5) ^\circ\text{C} - 336 \text{ h}$ .
410	Thermal endurance	Applicable EN 2234. 40 000 h at $260 ^\circ\text{C}$ .
411	Resistance to fluids	Applicable EN 2234.
412	Humidity resistance	Not applicable.
413	Wrap back test	Applicable.
414	Differential scanning calorimeter (DSC test)	Not applicable.

continued



Table 2 (concluded)

EN 3475-	Designation of the test	Remarks
501	Dynamic cut-through	Applicable to codes 004 to 020 included. Temperature 260 °C – 1 h. See Table 3.
502	Notch propagation	Applicable to codes 004 to 020 included. Depth notch: 0,25 mm.
503	Scrape abrasion	Applicable to codes 004 to 020 included. See Table 3.
504	Torsion	Applicable to codes 004 to 020 included. $T_3 = (260 \pm 5) \text{ °C}$ . $T_4 = (275 \pm 5) \text{ °C}$ .
505	Tensile test on conductors and strands	Applicable.
506	Plating continuity	Applicable.
507	Adherence of plating	Applicable.
508	Plating thickness	Applicable.
509	Solderability	Not applicable.
510	Tensile strength and elongation of extruded insulation, sheath and jacket material	Not applicable.
511	Cable-to-cable abrasion	Not applicable.
512	Flexure endurance	Not applicable.
601	Smoke density	Not applicable.
602	Toxicity	Not applicable.
603	Resistance to wet arc tracking	Applicable. Wire damage $\leq 70$ mm. 75 % of collateral wires must pass the wet dielectric voltage proof test (EN 3475-302).
604	Resistance to dry arc propagation	Applicable Wire damage $\leq 70$ mm 75 % of collateral wires must pass the wet dielectric voltage proof test (EN 3475-302)
605	Wet short circuit test	Applicable. Wire damage $\leq 70$ mm.
701	Strippability and adherence of insulation to the conductor	Strippability applicable. Adherence not applicable.
702	Screen pushback capability	Not applicable.
703	Permanence of manufacturer's marking	Applicable.
704	Flexibility	Not applicable.
705	Contrast measurement	Applicable $\geq 50$ % to single core. Not applicable to multicore.
706	Laser markability	Applicable.