



# SLOVENSKI STANDARD SIST EN 2267-005:2009

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Aerospace series - Cables, electrical, for general purpose - Operating temperatures between - 55 °C and 260 °C - Part 005: UV laser printable - Product standard

Luft- und Raumfahrt - Leitungen, elektrisch, für allgemeine Verwendung - Betriebstemperaturen zwischen - 55 °C und 260 °C - Teil 005: UV Laser bedruckbar - Produktnorm

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Série aérospatiale - Câbles, électriques, d'usage général - Températures de fonctionnement comprises entre - 55 °C et 260 °C - Partie 005 : Marquables au laser UV - Norme de produit

Ta slovenski standard je istoveten z: EN 2267-005:2006

### ICS:

49.060 Š^cø\ æš Å^•[ ||ø\ æ Aerospace electric  
^|\ dā } æ ] !^ { æš Å ä c { ã equipment and systems

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 2267-005**

June 2006

ICS 49.060

English Version

**Aerospace series - Cables, electrical, for general purpose -  
Operating temperatures between - 55 C and 260 C - Part 005:  
UV laser printable - Product standard**

Série aéronautique - Câbles, électriques, d'usage général -  
Températures de fonctionnement comprises entre - 55 C  
et 260 C - Partie 005 : Marquables au laser UV - Norme de  
produit

Luft- und Raumfahrt - Leitungen, elektrisch, für allgemeine  
Verwendung - Betriebstemperaturen zwischen - 55 C und  
260 C - Teil 005: UV Laser bedruckbar - Produktnorm

This European Standard was approved by CEN on 26 September 2005.

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.

CEN members are the national standards bodies of 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 United Kingdom.



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## Foreword

This European Standard (EN 2267-005:2006) 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 2267-005:2006 (E)****1 Scope**

This standard specifies the characteristics of UV laser printable electrical cables for use in the on-board electrical systems of aircraft at operating temperatures between – 55 °C and 260 °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 2084, *Aerospace series — Cables, electric, single-core, general purpose, with conductors in copper or copper alloy — Technical specification.*

EN 2267-002, *Aerospace series — Cables, electrical, for general purpose — Operating temperatures between – 55 °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 9133, *Aerospace series — Quality management systems — Qualification procedure for aerospace standard parts.*

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**3 Terms, definitions and symbols**

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

**4 Materials and construction****4.1 Materials****Conductor:**

See EN 2267-002.

**Insulation:**

— for conductor sizes code 001 to 010:

- first layer polyimide with total thickness (nominal value) of 30 µm, coated on both sides with a layer 2,5 µm thick of fluorocarbon;

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\* All parts quoted in this standard.

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

- direction of winding immaterial – overlap 51 % min.;
- second layer polytetrafluoroethylene (PTFE) 0,06 mm thick before use – running in opposite direction to first layer – overlap 65 % min.; or two layers of polytetrafluoroethylene (PTFE) 0,06 mm thick before use – running in opposite direction to first layer – one layer 51 % min. overlap and one layer in opposite direction 20 % min. overlap;
- for conductor sizes code 012 to 051:
  - first layer polyimide with total thickness (nominal value) of 30  $\mu\text{m}$ , coated on both sides with a layer 2,5  $\mu\text{m}$  thick of fluorocarbon;
  - direction of winding immaterial – overlap 51 % min.;
  - second layer polytetrafluoroethylene (PTFE) 0,06 mm thick before use – running in opposite direction to first layer – overlap 74 % min.; or two layers of polytetrafluoroethylene (PTFE) 0,06 mm thick before use – running in opposite direction to first layer – one layer 51 % min. overlap and one layer in opposite direction 47 % min. overlap.

A top coat may be applied.

It shall be possible to mark the external surface of the insulation by UV laser printing.

## 4.2 Construction

See EN 2083 and Table 1.

### iTeh STANDARD PREVIEW Table 1 (standards.iteh.ai)

Code for nominal section	Nominal section $\text{mm}^2$	AWG <sup>a</sup>	Linear resistance at 20 °C $\Omega/\text{km}$ max.	External diameter mm		Mass kg/km max.
				min.	max.	
001	0,15	26	160,0	0,90	1,06	2,8
002	0,25	24	114,0	0,99	1,16	3,6
004	0,4	22	60,0	1,15	1,31	5,0
006	0,6	20	33,2	1,38	1,56	7,9
010	1	18	21,1	1,62	1,82	11,4
012	1,2	16	14,5	1,97	2,18	16,5
020	2	14	10,9	2,22	2,43	21,5
030	3	12	6,8	2,68	2,93	33,5
050	5	10	4,2	3,27	3,46	52,4
051 <sup>b</sup>	5	10	4,1	3,30	3,58	53,9

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

<sup>b</sup> Flexible construction which may be used as an alternative.

## 4.3 Number of cores

See EN 2267-002.

## EN 2267-005:2006 (E)

## 4.4 Colour coding of cores

See EN 2267-002.

## 5 Required characteristics

According to EN 2084 and EN 3475-100.

See Table 2.

Table 2

EN 3475-	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	Applicable $T_1 = (310 \pm 5) \text{ }^\circ\text{C}$ ; $T_2 = (450 \pm 5) \text{ }^\circ\text{C}$
401	Accelerated ageing	Applicable Temperature $(310 \pm 5) \text{ }^\circ\text{C}$
402	Shrinkage and delamination	Applicable Temperature $(290 \pm 5) \text{ }^\circ\text{C}$ Maximum shrinkage at each end of cable: — $0,15 \text{ mm}^2$ to $0,6 \text{ mm}^2$ : 0,8 mm — $1 \text{ mm}^2$ to $1,2 \text{ mm}^2$ : 1 mm — $2 \text{ mm}^2$ to $5 \text{ mm}^2$ : 1,2 mm
403	Delamination and blocking	Applicable Temperature $(310 \pm 5) \text{ }^\circ\text{C}$
404	Thermal shock	Applicable Temperature $(290 \pm 5) \text{ }^\circ\text{C}$ Maximum shrinkage at each end of cable: — $0,15 \text{ mm}^2$ to $0,6 \text{ mm}^2$ : 0,8 mm — $1 \text{ mm}^2$ to $1,2 \text{ mm}^2$ : 1 mm — $2 \text{ mm}^2$ to $5 \text{ mm}^2$ : 1,2 mm
405	Bending at ambient temperature	Applicable
406	Cold bend test	Applicable

continued



Table 2 (continued)

EN 3475-	Test	Details																																
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 260 °C)																																
411	Resistance to fluids	Applicable																																
501	Dynamic cut-through	Applicable Temperatures (20 ± 3) °C and (260 ± 5) °C <table border="1" data-bbox="938 757 1417 1149"> <thead> <tr> <th rowspan="2">Nominal section mm<sup>2</sup></th> <th colspan="2">Cut-through force</th> </tr> <tr> <th>20 °C N</th> <th>260 °C N</th> </tr> </thead> <tbody> <tr><td>0,15</td><td>70</td><td>15</td></tr> <tr><td>0,25</td><td>85</td><td>30</td></tr> <tr><td>0,40</td><td>110</td><td>45</td></tr> <tr><td>0,60</td><td>140</td><td>55</td></tr> <tr><td>1,00</td><td>140</td><td>70</td></tr> <tr><td>1,20</td><td>150</td><td>85</td></tr> <tr><td>2,00</td><td>150</td><td>95</td></tr> <tr><td>3,00</td><td>165</td><td>105</td></tr> <tr><td>5,00</td><td>180</td><td>120</td></tr> </tbody> </table>	Nominal section mm <sup>2</sup>	Cut-through force		20 °C N	260 °C N	0,15	70	15	0,25	85	30	0,40	110	45	0,60	140	55	1,00	140	70	1,20	150	85	2,00	150	95	3,00	165	105	5,00	180	120
Nominal section mm <sup>2</sup>	Cut-through force																																	
	20 °C N	260 °C N																																
0,15	70	15																																
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1,20	150	85																																
2,00	150	95																																
3,00	165	105																																
5,00	180	120																																
502	Notch propagation	Applicable Notch depth : 40 µm																																
503	Scrape abrasion	Applicable Test force on needle for cables: — 0,15 mm <sup>2</sup> = 5 N — 0,25 mm <sup>2</sup> to 0,6 mm <sup>2</sup> = 8 N — 1 mm <sup>2</sup> to 1,2 mm <sup>2</sup> = 10 N — 2 mm <sup>2</sup> to 5 mm <sup>2</sup> = 12 N																																
504	Torsion	Applicable $T_3 = (260 \pm 5) \text{ °C}$ ; $T_4 = (310 \pm 5) \text{ °C}$																																
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																																
601	Smoke density	Applicable																																
602	Toxicity	Applicable																																

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