
Aeronavtika - Kabli, električni, za splošne namene, eno- in večžilni - Družina XLETFE - 003. del: Pocinjeni baker - Obratovalne temperature med -65 °C in 135 °C - Enojno ekstrudirana izolacija za notranjo uporabo - Možnost UV-laserskega tiskanja - Standard za izdelek

Aerospace series - Cables, electrical, for general purpose, single and multicore assembly - XLETFE Family - Part 003: Tin plated copper - Operating temperatures, between - 65 °C and 135 °C - Single extruded wall for enclosed applications - UV laser printable - Product standard

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Luft- und Raumfahrt - Ein- und mehradrige elektrische Leitungen für allgemeine Verwendung - XLETFE Familie - Teil 003: Kupfer verzinkt - Betriebstemperaturen zwischen - 65 °C und 135 °C - Einfach extrudierte Isolierung für interne (geschützte) Verwendung - UV-Laser bedruckbar - Produktnorm

Série aérospatiale - Câbles, électriques, d'usage général, mono et multiconducteurs - Famille XLETFE - Partie 003 : Cuivre étamé - Températures de fonctionnement comprises entre - 65 °C et 135 °C - Fil simple isolé pour applications internes - Marquable au laser UV - Norme de produit

Ta slovenski standard je istoveten z: EN 4611-003:2012

ICS:

49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems
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EUROPEAN STANDARD

EN 4611-003

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2012

ICS 49.060

English Version

**Aerospace series - Cables, electrical, for general purpose,
single and multicore assembly - XLETFE Family - Part 003: Tin
plated copper - Operating temperatures, between -65 °C and
135 °C - Single extruded wall for enclosed applications - UV
laser printable - Product standard**

Série aérospatiale - Câbles, électriques, d'usage général,
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Leitungen für allgemeine Verwendung - XLETFE Familie -
Teil 003: Kupfer verzinkt - Betriebstemperaturen zwischen -
65 °C und 135 °C - Einfach extrudierte Isolierung für interne
(geschützte) Verwendung - UV-Laser bedruckbar -
Produktnorm

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Foreword

This document (EN 4611-003:2012) 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 August 2012, and conflicting national standards shall be withdrawn at the latest by August 2012.

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 4611-003:2012 (E)**1 Scope**

This European Standard specifies the characteristics of UV laser printable, tin plated copper conductor electrical cables, Crosslinked Ethylene Tetra Fluoro Ethylene co-polymer (XLETFE) family, for use in the on-board electrical systems of aircraft operating at temperatures between $-65\text{ }^{\circ}\text{C}$ and $135\text{ }^{\circ}\text{C}$, operating at voltages not exceeding 600 V r.m.s and frequencies not exceeding 2 000 Hz. These cables are for enclosed applications e.g. within equipment or conduit; they are only suitable for open airframe use when provided with additional protection against mechanical abuse. In case of conflict between this European Standard and other referenced documents the requirements of this European Standard should take precedence.

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 2084, *Aerospace series – Cables, electric, single-core, general purpose, with conductors in copper or copper alloy – Technical specification*

EN 2235, *Aerospace series – Single and multicore electrical cables, screened and jacketed*

EN 3475-100¹, *Aerospace series – Cables, electrical, aircraft use – Test methods – Part 100: General*

EN 4611-002, *Aerospace series – Cables, electrical, for general purpose, single and multicore assembly – XLETFE Family – Part 002: General*

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

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3 Terms, definitions, symbols and abbreviations

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

¹ All parts quoted in Table 2 and Table 3.

4 Materials and construction

4.1 Materials

Conductor

The cable conductors shall be made of tin plated copper according to EN 4611-002.

Insulation

Single layer of extruded XLETFE

For single core, it shall be possible to mark the outer insulation by UV laser printing.

4.2 Construction

See EN 4611-002, Table 1 and Table 2.

Table 1 – Single core cables

Code for nominal section	Nominal section mm ²	AWG ^a	Linear resistance at 20 °C	External diameter		Mass kg/km max.	Minimum insulation thickness mm
			Ω/km max.	mm min.	mm max.		
001 ^b	0,15	26	149,0	0,72	0,82	1,88	0,13
002 ^b	0,25	24	106,0	0,81	0,91	2,57	0,13
004	0,4	22	60,0	0,98	1,08	3,98	0,13
006	0,6	20	33,2	1,19	1,35	6,56	0,13
010	1	18	21,1	1,44	1,59	9,81	0,13
012	1,2	16	15,3	1,56	1,82	13,27	0,13
020	2	14	10,9	1,93	2,10	19,57	0,13
030	3	12	6,80	2,37	2,54	29,73	0,13

^a AWG = Closest American Wire Gauge.

^b Silver plated copper alloy conductor

Table 2 – Multicore without screen or jacket

Size	AWG ^a	2 core			3 core			4 core		
		Max. dia. mm	Mass max. kg/km	DC Res. Ω /km max.	Max. dia. mm	Mass max. kg/km	DC Res. Ω /km max.	Max. dia. mm	Mass max. kg/km	DC Res. Ω /km max.
001 ^b	26	1,64	3,83	153,5	1,77	5,74	153,5	1,98	7,65	153,5
002 ^b	24	1,82	5,20	109,2	1,97	7,90	109,2	2,20	10,39	109,2
004	22	2,16	8,04	61,8	2,33	12,05	61,8	2,61	16,07	61,8
006	20	2,70	13,33	34,2	2,92	19,81	34,2	3,27	26,65	34,2
010	18	3,18	19,81	21,7	3,43	29,72	21,7	3,85	39,63	21,7
012	16	3,64	25,64	15,8	3,93	38,46	15,8	4,40	51,28	15,8
020	14	4,58	39,52	11,2	4,95	59,29	11,2	5,54	79,05	11,2
030	12	5,48	60,06	7,0	5,92	90,09	7,0	6,63	120,12	7,0

^a AWG = Closest American Wire Gauge.

^b Silver plated copper alloy conductor

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4.3 Number of cores

See EN 4611-002.

See EN 2235 for cabling.

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4.4 Colour coding of cores

See EN 4611-002.

5 Required characteristics

According to EN 2084 and EN 3475-100

See Table 3.

NOTE Tests EN 3475-302 to EN 3475-706 should be performed on the single core cable.

Table 3

EN 3475-	Test	Details
201	Visual examination	Applicable
202	Mass	Applicable; see Table 1 and Table 2.
203	Dimensions	Applicable; see Table 1 and Table 2.
301	Ohmic resistance per unit length	Applicable; see Table 1 and Table 2.
302	Voltage proof test	Applicable
303	Insulation resistance	Applicable (20 ± 2) °C, 500 MΩ.km minimum (95 ± 2) °C, 1 MΩ.km minimum
304	Surface resistance	Applicable 12 500 MΩ.mm minimum
305	Overload resistance	Applicable $T_1 = (250 \pm 5) \text{ °C}$; $T_2 = (380 \pm 5) \text{ °C}$
401	Accelerated ageing	Applicable Temperature (200 ± 3) °C
402	Shrinkage and delamination	Applicable Temperature (150 ± 5) °C Maximum shrinkage at each end of cable: 0,80 mm on size 001 to 006 1,00 mm on size 010 to 012 1,20 mm on size 020 to 030
403	Delamination and blocking	Applicable Temperature (150 ± 5) °C
404	Thermal shock	Applicable Temperatures (−65 ± 3) °C and (135 ± 3) °C Maximum shrinkage at each end of cable: 1,00 mm on size 001 to 030
405	Bending at ambient temperature	Applicable
406	Cold bend test	Applicable Temperature (−65 ± 2) °C
407	Flammability	Applicable Methods 1 and 2 Flame applied for 15 s Extinguishing time: 3 s max.
408	Fire resistance	Not applicable
409	Air-excluded ageing	Not applicable
410	Thermal endurance	Applicable 50 000 hours Temperature 135 °C
411	Resistance to fluids	Applicable
412	Humidity resistance	Applicable Method B Temperature (90 ± 2) °C Duration 672 hours

(continued)