SLOVENSKI STANDARD
SIST EN 4611-004:2019

01-februar-2019

Nadomešča:
SIST EN 4611-004:2012

Aeronavtika - Kabli, električni, za splošne namene, eno- in večžilni - Družina XLETFE - 004. del: Pocinjeni baker - Obratovalne temperature med -65 °C in 135 °C - Dvojno ekstrudirana izolacija za zunanjo uporabo - Potiskljiva z UV-laserjem - Standard za proizvod

Aerospace series - Cables, electrical, for general purpose, single and multicore assembly - XLETFE Family - Part 004: Tin plated copper - Operating temperatures, between - 65 °C and 135 °C - Dual extruded wall for open applications - UV laser printable - Product standard

Luft- und Raumfahrt - Ein- und mehradrige elektrische Leitungen für allgemeine Verwendung - XLETFE Familie - Teil 004: Kupfer verzinnt - Betriebstemperaturen zwischen - 65 °C und 135 °C - Doppelt extrudierte Isolierung für externe Verwendung - UV-Laser bedruckbar - Produktnorm

Série aérospatiale - Câbles, électriques, d'usage général, mono et multiconducteurs - Famille XLETFE - Partie 004 : Cuivre étamé - Températures de fonctionnement comprises entre - 65 °C et 135 °C - Fil double isolé pour applications externes - Marquable au laser UV - Norme de produit

Ta slovenski standard je istoveten z: **EN 4611-004:2018**

ICS:

29.060.20	Kabli	Cables
49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems

SIST EN 4611-004:2019 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4611-004

November 2018

ICS 49.060

Supersedes EN 4611-004:2012

English Version

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This European Standard was approved by CEN on 20 May 2018.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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Contents

Page

European foreword

This document (EN 4611-004:2018) 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 May 2019, and conflicting national standards shall be withdrawn at the latest by May 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document will supersede EN 4611-004:2012.

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

1 Scope

This European Standard specifies the characteristics of UV laser printable, tin plated 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 °C and 135 °C. The voltage rating is 600 V rms at sea level. This insulation system has been used in aerospace applications using 115 V (phase-to-neutral) 400 Hz and 28 Vdc. Verification of the suitability of cables for use in other electrical systems is the responsibility of the user.

These cables are suitable for airframe use although the use of additional protection against mechanical abuse may be necessary in some applications. In case of conflict between this standard and other referenced documents the requirements of this standard shall take precedence.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, electrical, general purpose, with conductors in copper or copper alloy — Technical specification*

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

EN 3475-100 (all parts), *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 Products*

3 Terms, definitions, symbols and abbreviations

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4 Materials and construction

4.1 Materials

4.1.1 Conductor

The cable conductors shall be made of tin plated copper according to EN 4611-002 and EN 2083 code B.

4.1.2 Insulation for conductor all size codes

— first insulator extruded XLETFE, coloured blue or a contrasting colour if the second is blue;

— second insulator 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 and Table 1.

Table 1 — Single core cables

Code for nominal section	Nominal section	AWG [a]	Linear resistance at 20 °C	External diameter		Mass	Minimum insulation thickness
			Ω/km	mm	mm	kg/km	mm
	mm²		max.	min.	max.	max.	
001 [b]	0,15	26	149,0	0,83	0,92	2,10	0,17
002 [b]	0,2	24	106,0	0,90	1,02	2,84	0,17
004	0,4	22	60,0	1,09	1,17	4,10	0,17
006	0,6	20	33,2	1,33	1,52	6,95	0,17
010	1	18	21,1	1,55	1,68	9,80	0,17
012	1,2	16	15,8	1,71	1,85	12,99	0,17
020	2	14	10,9	2,03	2,28	18,77	0,17
030	3	12	6,8	2,52	2,73	28,62	0,17
050	5	10	4,2	3,15	3,61	48,80	0,17
090	9	8	4,1	4,41	5,16	89,74	0,17
140	14	6	2,3	5,87	6,38	140,63	0,17
220	22	4	1,58	7,62	8,13	223,22	0,17
340	34	3	0,97	9,25	10,67	370,55	0,17
530	53	1	0,61	11,54	13,36	569,97	0,17
680	68	0	0,51	12,83	14,88	744,08	0,17

[a] AWG = Closest American Wire Gauge.

[b] Silver plated copper alloy.

Table 2 — Multicore without screen or jacket

Size	AWG [a]	2 core			3 core			4 core		
		Max. diameter mm	Mass max. kg/km	DC Res. Ω/km max.	Max. diameter mm	Mass max. kg/km	DC Res. Ω/km max.	Max. diameter mm	Mass max. kg/km	DC Res. Ω/km max.
001 [b]	26	1,90	4,71	153,5	2,05	7,07	153,5	2,29	9,42	153,5
002 [b]	24	2,26	6,70	109,2	2,44	10,05	109,2	2,72	13,4	109,2
004	22	2,52	9,23	61,8	2,72	13,85	61,8	3,05	18,47	61,8
006	20	3,00	14,45	34,2	3,24	21,67	34,2	3,63	28,90	34,2
010	18	3,48	21,29	21,7	3,76	31,93	21,7	4,21	42,57	21,7
012	16	3,74	26,32	16,3	4,04	39,48	16,3	4,53	52,64	16,3
020	14	4,88	41,67	11,2	5,27	62,51	11,2	5,90	83,34	11,2
030	12	5,90	63,64	7,0	6,37	95,46	7,0	7,14	127,29	7,0
050	10	7,22	98,57	4,3	7,80	147,86	4,3	8,74	197,14	4,3

[a] AWG = Closest American Wire Gauge.

[b] Silver plated copper alloy conductor.

4.3 Number of cores

See EN 4611-002.
See EN 2235 for cabling.

4.4 Colour coding of cores

See EN 4611-002.

5 Required characteristics

According to EN 2084, EN 4611-002 and EN 3475-100.

See Table 3.

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

Table 3 — Test reference *(1 of 5)*

EN 3475-	Designation of the 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 min. (95 ± 2) °C, 1 MΩ.km min.
304	Surface resistance	Applicable 12 500 MΩ.mm min.
305	Overload resistance	Applicable T_1 = (250 ± 5) °C; T_2 = (380 ± 5) °C
401	Accelerated ageing	Applicable Temperature (200 ± 3) °C See Table 4.
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 See Table 4. 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 see Table 4.
406	Cold bend test	Applicable Temperature (– 65 ± 2) °C See Table 4.
407	Flammability	Applicable Methods 1 and 2 Flame applied for 15 s Extinguishing time: 3 s max.