BS EN 4612-005:2011

BSI Standards Publication

Aerospace series — Cables, electrical, for general purpose, single and multicore assembly XLETFE Family jacketed or screened and jacketed

Part 005: Tin plated copper — Operating temperatures, between — 65 °C and 135 °C — Dual extruded wall for open applications, with jacket without screen - UV laser printable - Product standard

National foreword

This British Standard is the UK implementation of EN 4612-005:2011.

The UK participation in its preparation was entrusted to Technical Committee ACE/6, Aerospace avionic electrical and fibre optic technology.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Date	Text affected

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Aerospace series - Cables, electrical, for general purpose, single and multicore assembly XLETFE Family jacketed or screened and jacketed - Part 005: Tin plated copper - Operating temperatures, between - 65 °C and 135 °C - Dual extruded wall for open applications, with jacket without screen - UV laser printable - Product standard

Série aérospatiale - Câbles, électriques, d'usage général, mono et multiconducteurs - Famille XLETFE - Gainés ou blindés et gainés - Partie 005: Cuivre étamé - Températures de fonctionnement comprises entre - 65 °C et 135 °C - Fil double isolé pour applications externes, gainé non blindé - Marquable au laser UV - Norme de produit

Luft- und Raumfahrt - Ein- und mehradrige elektrische Leitungen für allgemeine Verwendung - XLETFE Familie - Mit Mantel oder geschirmt und Mantel - Teil 005: Kupfer verzinnt - Betriebstemperaturen zwischen - 65 °C und 135 °C - Doppelt extrudierte Isolierung für externe Verwendung, mit Mantel ohne Schirm - UV-Laser bedruckbar - Produktnorm

This European Standard was approved by CEN on 20 August 2011.

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

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Foreword

This document (EN 4612-005:2011) 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 April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.

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1 Scope

This European Standard specifies the characteristics of UV laser printable jacket, 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 at operating temperatures between – 65 °C and 135 °C, operating at voltages not exceeding 600 V r.m.s and frequencies not exceeding 2 000 Hz. These cables are suitable for airframe use without additional protection. In case of conflict between this standard and other referenced documents the requirements of this standard shall take precedence.

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

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* [1)]

EN 4611-004, *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* [1)]

EN 4612-002, *Aerospace series — Cables electrical, for general purpose, single and multicore assembly — XLETFE Family — Jacketed or screened and jacketed — Part 002: General*

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

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

These cables shall consist of the following:

— cores according to EN 4611-004;

— number of cores 2 (two) to 4 (four).

1) Published as ASD-STAN Prestandard at the date of publication of this standard (www.asd-stan.org).

Cores shall be twisted together according to EN 2235.

Filler cores shall not be permitted.

Outer jacket:

— XLETFE;

— it shall be possible to mark the jacket by UV laser printing;

— minimum thickness shall be 0,15 mm.

4.2 Construction

See Table 1.

Table 1 — Multicore without screen, with jacket

Size	AWG [a]	2 core			3 core			4 core		
		Max. dia. mm	Mass kg/km max.	DC Res. Ω/km max.	Max. dia. mm	Mass kg/km max.	DC Res. Ω/km max.	Max. dia. mm	Mass kg/km max.	DC Res. Ω/km max.
001 [b]	26	2,40	7,02	153,5	2,56	9,82	153,5	2,82	12,65	153,5
002 [b]	24	2,75	9,43	109,2	2,94	13,31	109,2	3,24	17,28	109,2
004	22	2,92	11,65	61,8	3,12	16,70	61,8	3,45	21,74	61,8
006	20	3,40	17,66	34,2	3,64	25,44	34,2	4,03	33,35	34,2
010	18	3,88	24,54	21,7	4,16	35,77	21,7	4,61	47,01	21,7
012	16	4,16	31,11	15,8	4,46	45,30	15,8	4,99	59,68	15,8
020	14	5,34	46,86	11,2	5,73	68,65	11,2	6,36	90,44	11,2
030	12	6,36	69,86	7,0	6,83	102,83	7,0	7,60	135,81	7,0
050	10	7,68	106,11	4,3	8,26	156,81	4,3	9,20	207,50	4,3

[a] AWG = Closest American Wire Gage.

[b] Tin plated copper alloy conductor.

4.3 Colour coding of cores and jacket

See EN 4611-002.

5 Required characteristics

According to EN 2235 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 (20 ± 2) °C, 500 MΩ.km minimum (95 ± 2) °C, 1 MΩ.km minimum
304	Surface resistance	Not applicable
305	Overload resistance	Not applicable
401	Accelerated ageing	Applicable Temperature (200 ± 3) °C
402	Shrinkage and delamination	Applicable Temperature (150 ± 5) °C Maximum shrinkage at each end of cable: Jacket: 2 mm on size code 001 to 010 3 mm on size code 012 to 050 Cores: 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 ± 2) °C and (260 ± 5) °C Maximum shrinkage at each end of cable: Jacket: 2 mm on size code 001 to 010 3 mm on size code 012 to 050 Cores: 0,80 mm on size 001 to 006 1,00 mm on size 010 to 012 1,20 mm on size 020 to 030
405	Bending at ambient temperature	Applicable

continued

Table 2 *(continued)*

EN 3475-	Test	Details
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	Not applicable
411	Resistance to fluids	Applicable Swell not greater than 10 % Scrape not applicable
412	Humidity resistance	Applicable Method B Temperature (90 ± 2) °C Duration 672 hours
413	Wrap back test	Not applicable
414	Differential scanning calorimeter (DSC test)	Not applicable
501	Dynamic cut-through	Not applicable
502	Notch propagation	Not applicable
503	Scrape abrasion	Not applicable
504	Torsion	Not applicable
505	Tensile test on conductors and strands	Not applicable
506	Plating continuity	Not applicable
507	Adherence of plating	Not applicable
508	Plating thickness	Not applicable
509	Solderability	Not applicable
510	Tensile strength and elongation of extruded insulation, sheath and jacket material	Applicable jacket Eb 75 % minimum TS 34 MPa minimum
511	Cable-to-cable abrasion	Not applicable
512	Flexure endurance	Not applicable
601	Smoke density	Subject to agreement between customer and supplier
602	Toxicity	Subject to agreement between customer and supplier

continued

Table 2 *(concluded)*

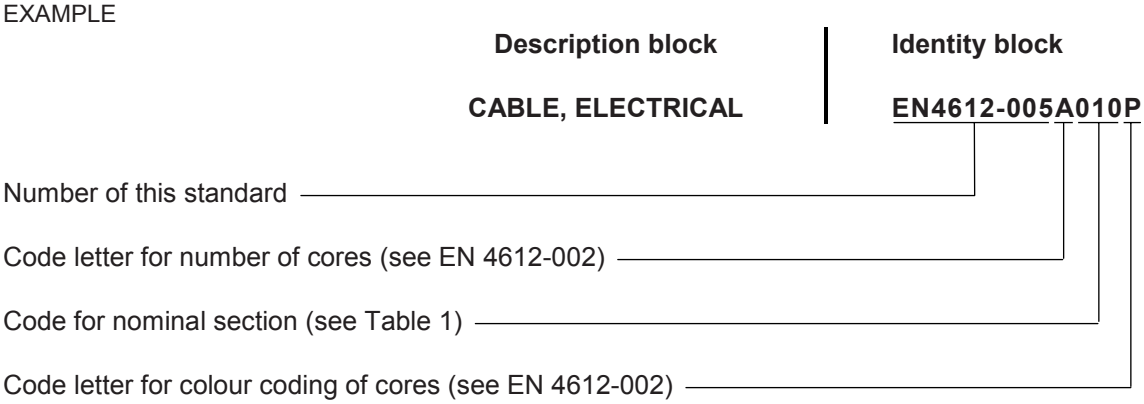
EN 3475-	Test	Details
603	Resistance to wet arc tracking	Not applicable
604	Resistance to dry arc propagation	Not applicable
605	Wet short circuit test	Not applicable
701	Strippability and adherence of insulation to the conductor	Not applicable
702	Screen pushback capability	Not applicable
703	Permanence of manufacturer's marking	Applicable
704	Flexibility	Not applicable
705	Contrast measurement	Applicable Laser marking $K \geq 50$ %
706	Laser markability	Not applicable

6 Quality assurance

See EN 9133.

7 Designation

EXAMPLE



8 Identification and marking

See EN 4612-002.

9 Packaging, labelling and delivery lengths

See EN 2235.

10 Technical specification

See EN 2235.

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