SLOVENSKI STANDARD
SIST EN 2234:2018

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Nadomešča:
SIST EN 2234:2012

Aeronavtika - Električni ognjevzdržni kabli - Tehnična specifikacija

Aerospace series - Cable, electrical, fire resistant - Technical specification

Luft- und Raumfahrt - Elektrische Leitungen, feuerbeständig - Technische Lieferbedingungen

Série aérospatiale - Câbles électriques résistant au feu - Spécification technique

Ta slovenski standard je istoveten z: EN 2234:2018

ICS:

13.220.50	Požarna odpornost gradbenih materialov in elementov	Fire-resistance of building materials and elements
49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems

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EUROPEAN STANDARD

NORME EUROPÉENNE

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English Version

Aerospace series - Cable, electrical, fire resistant - Technical specification

Série aérospatiale - Câbles électriques résistant au feu - Spécification technique

Luft- und Raumfahrt - Elektrische Leitungen, feuerbeständig - Technische Lieferbedingungen

This European Standard was approved by CEN on 6 November 2017.

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

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European foreword

This document (EN 2234:2018) 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of an identical text or by endorsement, at the latest by November 2018, and conflicting national standards shall be withdrawn at the latest by November 2018.

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 supersedes EN 2234:2012.

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 document specifies the required characteristics and test procedures for fire resistant or fire-proof electrical cables for use in aircraft electrical systems. These cables should also maintain a specific surface resistance when they are subjected to a flame of 1 100 °C after 5 minutes (fire resistant) or 15 minutes (fire-proof) exposure.

The insulation of these cables is designed to withstand aircraft voltages at a frequency not exceeding 2 000 Hz. Unless specified by individual product standards the maximum demonstrated ac voltage of rating of these cables is 115 V rms (phase to neutral) and 200 V rms (phase to phase) and a long term temperature of up to 260 °C (ambient temperature plus temperature rise in conductor).

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 3475-100 (all parts), *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*

EN 9102, *Aerospace series — Quality systems — First article inspection*

EN 9133, *Aerospace series — Quality Management Systems — Qualification Procedure for Aerospace Standard Products*

ISO 2574, *Aircraft — Electrical cables — Identification marking*

ISO 8815, *Aircraft — Electrical cables and cable harnesses — Vocabulary*

IEC 60028:1925, *International standard of resistance for copper*

3 Terms, definitions and symbols

For the purposes of this document, the terms, definitions and symbols given in ISO 8815 and 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 Conductors

4.1.1 Materials

The individual strands used for the conductors shall be cylindrical and shall be:

— of nickel clad copper alloy for nominal cross section of 0,25 mm^2 and 0,4 mm^2;

— of nickel clad copper for nominal sections ≥ 0,6 mm^2.

The copper shall meet the requirements of IEC 60028 and the copper alloy the requirements of this standard.

The nickel shall not represent less than 27 % of the total mass of the individual strand.

Individual strands shall show the following minimum breaking strength:

— 280 N/mm² for nickel clad copper;

— 315 N/mm² for nickel clad copper alloy.

4.1.2 Lay length

Up to 9 mm² cross section inclusive (code 090), concentric or unilay conductors are used. The lay for the stranded conductor, checked over the outside layer of a test piece 1 m long, shall be between 8 times and 16 times the maximum diameter of this conductor.

For sectional areas between 14 mm² and 68 mm² (codes 140 to 680), the conductor comprises concentric or bunched conductors twisted together. The lay of the strands for the basic concentric or bunched conductors shall not exceed 30 times the diameter of the concentric or bunched conductor in question.

The lay for concentric (or bunched) conductors, measured over the outer layer of the conductor, shall be between 8 times and 16 times the maximum conductor diameter.

In all cases the lay of the outer layer shall be left-hand.

4.1.3 Joints

The conductors shall be free from any joints. Each strand comprising the conductors may, however, include soldered or brazed joints. For strands with a diameter of 0,25 mm or greater, butt joints shall be used.

The distance between two joints in individual strands shall exceed 3 m, measured between different strands.

4.1.4 Compaction

Compaction of the causing deformation of the strands or damage to the plating is not permitted.

4.2 Construction

Finished cables

The insulation shall be of a material, which takes on the circular shape of the conductor throughout its length. It shall closely cover the conductor without adhering to it, so that it reduces the corona effect and the risk of blistering and heat corrosion due to voids and gaseous discharges.

The insulation shall be neither too tight nor too loose, so as to provide satisfactory mechanical characteristics and be easily removable using commercially available tools. (See Table 1, § 6.45).

The protective sheath shall be of a material, which takes on the round shape of the insulated conductor lying under it. It shall provide adequate protection from mechanical damage and contamination by liquids, as specified in the product standard. The outer surface shall be smooth and suitable for identification marking.

The protective sheath shall not have a corrosive effect on the screen and shall be resistant to fungus and other.

5 Required characteristics

The characteristics of the cables, tested according to the methods described hereafter shall comply with the values given in the product standard.

6 Tests method

See Table 1.

Table 1 — Tests: methods, application, requirements

§ No.	Tests							Requirements (and/or particulars)
	Description	EN 3475- (and/or particulars)	Qualification [a] (see 7.1).	First article inspection (see 7.2.5)	Each delivery		Periodic every three years (7.2.4)	
					On all cables (7.2.1 and 7.2.2)	Prior to delivery (7.2.3)		
6	Test conditions	100	X	X	X	X	X	—
6.1	Visual examination	201	3	3	X			Product standard
6.2	Mass	202 minimum length 0,5 m	3	3		X		Product standard
6.3	Dimensions	203	3	3	X	X	X	Product standard
6.4	Ohmic resistance per unit length	301	3	3		X		Product standard
6.1.5	Voltage proof test: — immersion test; — dry test; — or dry impulse test.	302 Alternative to dry test	 3	 3	 X X	 X		 2,5 KV r.m.s. 5 KV r.m.s. 8 KV peak voltage
6.6	Insulation resistance — at (20 ± 2) °C; — at (95 ± 2) °C.	303	3	3		 X	 X	For a length of 1 km: 500 MΩ 1 MΩ
6.7	Surface resistance	304	3					Minimum: 1 250 mΩ × mm
6.8	Overload resistance	305 T_1 and T_2: product standard	3				X	Applicable to code 006 only
6.9	Continuity of conductors	306	X	X	X			—
6.10	Accelerated ageing	401 Mandrel diameter and test load: Table 5	3	3			X	—

§ No.	Tests							Requirements (and/or particulars)
	Description	EN 3475- (and/or particulars)	Qualification [a] (see 7.1).	First article inspection (see 7.2.5)	Each delivery		Periodic every three years (7.2.4)	
					On all cables (7.2.1 and 7.2.2)	Prior to delivery (7.2.3)		
6.11	Shrinkage and delamination	402 Temperature: product standard	3	3		X		Product standard
6.12	Delamination and blocking	403 Mandrel diameter: Table 5 Temperature: product standard	3	3		X		Product standard
6.13	Thermal shock	404 Temperature: product standard	3	3			X	Product standard
6.14	Bending at ambient temperature	405 Mandrel diameter: Table 5	3				X	—
6.15	Cold bend test	406 Mandrel diameter and test load: Table 5 Temperature: product standard	3	3			X	Product standard
6.16	Flammability	407	3				X	Product standard
6.17	Fire resistance	408 Per fluid tested	1	X		X		Without fluid immersion for tests prior to delivery.
6.18	Air-excluded ageing	409 Temperature and time: product standard	3				X	—
6.19	Thermal endurance	410 Temperature and time: product standard	X					Product standard Applicable to code 006 only. 4 × 10 samples
6.20	Resistance to fluids	411 Per fluid tested	1				X	—
6.21	Humidity resistance	412 Method A or B as requested in product standard	3				X	—
6.22	Wrap back test	413	3	3		X		Applicable to cables ≤ 5 mm²