



SLOVENSKI STANDARD

SIST EN 2235:2015

01-oktober-2015

Nadomešča:
SIST EN 2235:2009

Aeronavtika - Eno- in večžilni električni kabli, oklopljeni in oplaščeni - Tehnična specifikacija

Aerospace series - Single and multicore electrical cables, screened and jacketed - Technical specification

Luft- und Raumfahrt - Ein- und mehradrige geschirmte und ummantelte elektrische Leitungen - Technische Lieferbedingungen

Série aérospatiale - Câbles électriques, mono et multiconducteurs, blindés et gainés - Spécification technique

Ta slovenski standard je istoveten z: EN 2235:2015

ICS:

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

SIST EN 2235:2015 en,fr,de

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EUROPEAN STANDARD

EN 2235

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2015

ICS 49.060

Supersedes EN 2235:2006

English Version

Aerospace series - Single and multicore electrical cables, screened and jacketed - Technical specification

Série aérospatiale - Câbles électriques, mono et
multiconducteurs, blindés et gainés - Spécification
technique

Luft- und Raumfahrt - Ein- und mehradrige geschirmte und
ummantelte elektrische Leitungen - Technische
Lieferbedingungen

This European Standard was approved by CEN on 29 November 2014.

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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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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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 2235:2015) 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 February 2016, and conflicting national standards shall be withdrawn at the latest by February 2016.

This document supersedes EN 2235:2006.

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, 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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EN 2235:2015 (E)

1 Scope

This European Standard specifies the required characteristics, test methods, qualification and acceptance conditions of single and multicore cables, screened, jacketed and multicore jacketed cables for use in aircraft electrical systems.

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 2083, *Aerospace series — Copper or copper alloy conductors for electrical cables — Product standard*

EN 2084, *Aerospace series — Cables, electrical, single-core, general purpose, with conductors in copper or copper alloy — Technical specification*

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 4434, *Aerospace series — Copper or copper alloy lightweight conductors for electrical cables — Product standard (Normal and tight tolerances)*

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

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8815 and EN 3475-100 apply.

4 Materials and construction of cables

4.1 General

The individual cores shall be qualified to EN 2083 or EN 4434, EN 2084 and the product standards.

4.2 Materials

The materials shall conform to the product standard.

4.3 Construction of cables

4.3.1 General

The permissible operating temperature of conductors shall not be lower than the maximum operating temperature of the cable as a whole.

4.3.2 Cabled cores

The lay length of the outer lay shall not be less than eight times and not more than 16 times the nominal diameter of the cabled cores.

The core shall not be spliced.

Where filler cores are used, this shall be specified in the product standard.

4.3.3 Screened cables

4.3.3.1 General

The individual strands used for the screen shall be free from kinks, loops or breaks; their surface shall be free from corrosion and other contamination. They shall satisfy the mechanical tests in EN 3475-505 to EN 3475-508 before use.

The screen shall be in contact with all the cabled cores.

Where spiral screening is used, the lay direction shall be contrary to that of the cabled cores.

4.3.3.2 Joints

Joints in the individual strands of the screen shall be made by soldering or by laying the individual strands together over a length of at least 10 mm.

There shall be no more than one joint per 3 m cable length (measured between different individual strands).

4.3.3.3 Braid screen pushback capability

In accordance with Table 1, test 6.48. [SIST EN 2235:2015
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4.3.3.4 Angle of spiral screening or braiding

The angle γ of spiral screening or braiding (as shown in Figure 1), measured against the longitudinal axis of the cable shall be at least 10°.

4.3.3.5 Screen coverage

The screen shall have a coverage β of at least 90 % for spiral screening and at least 85 % for braiding.

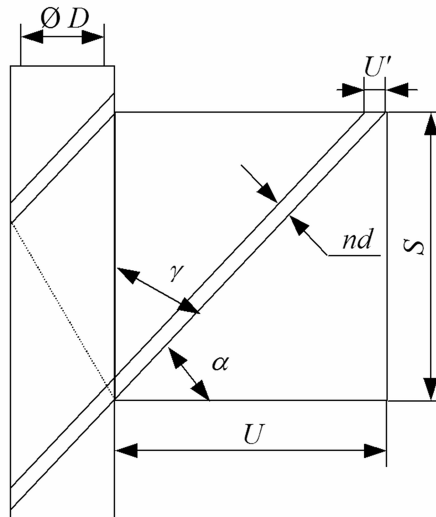


Figure 1 — Screen coverage

The cable covering is calculated using the following formula:

— for spirals:

$$U = \pi (D + d) \quad \text{and} \quad S = \pi (D + d) \tan \alpha \quad F = U' Z / U = n d Z / [\pi (D + d) \sin \alpha] \quad \beta = F \times 100 (\%)$$

— for braids:

$$U = \pi (D + 2d) \quad \text{and} \quad S = \pi (D + 2d) \tan \alpha$$

— For spiral screen:

the maximum length T of the non-covered area is 2 mm, and
 the relative aperture (versus lay length) of the screening 100 T/L shall be less than 5 %.

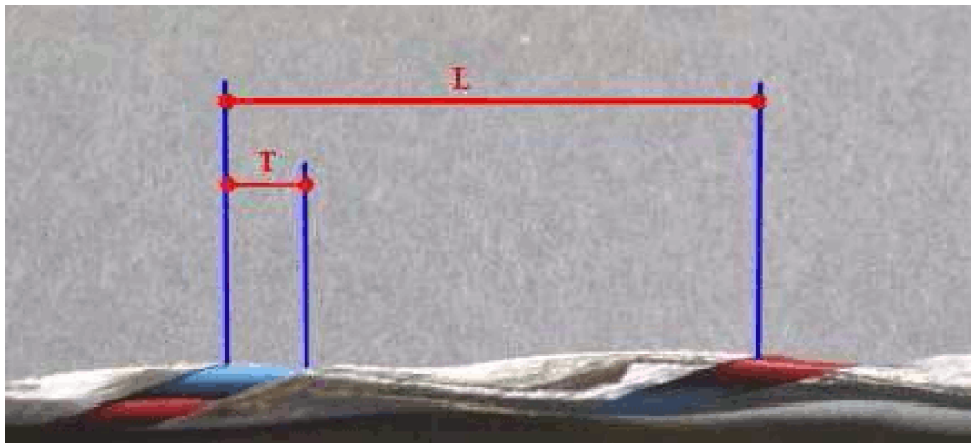


Figure 2

For braids, the filling factor F and coverage β , taking into account both braiding directions and a symmetrical braiding pattern are:

$$F = (U'/U) (Z/2) = \{n d / [\pi (D + 2d) \sin \alpha]\} (Z/2) \quad \text{and} \quad \beta = F (2 - F) \times 100 (\%)$$

where

S = lay length of screen in mm;

D = diameter under screen in mm (for cables with 2 or more cores without fillers: $D = (\pi + N) b / \pi$);

d = diameter of screen strands in mm;

N = number of cores;

n = number of strands per carriers;

b = diameter of core in mm;

Z = total number of carriers;

F = filling factor;

β = optical coverage;

U = see Figure 1;

U' = $n d / \sin \alpha$;

γ = strand angle;

α = $\pi / 2 - \gamma$.

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5 Required characteristics

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

6 Tests methods

See Table 1.

Table 1 — Tests, methods, application, requirements (1 of 4)

§ No.	Tests							Requirements (and/or particulars)
	Description	EN 3475- (and/or particulars)	Qualification ^a (see 7.1).	First article (see 7.1.5)	Each delivery		Periodic every three years (7.2.4)	
					On all cables (7.2.1 and 7.2.2)	Prior to delivery (7.2.1 and 7.2.2)		
6	Test conditions	100	X	X	X	X	X	
6.1	Coverage		X	X		X		See 4.3.3.5.
6.2	Spiral screening or braiding angle		X	X			X	See 4.3.3.4.
6.3	Visual examination	201	X	X	X			Marking: according to Clause 8.