

SLOVENSKI STANDARD
SIST EN 2713-012:2022**01-april-2022****Nadomešča:****SIST EN 2713-012:2017**

Aeronavtika - Eno- ali večžilni električni kabli za splošno uporabo - Delovne temperature med -55 °C in 200 °C - 012. del: MNA (1 jedro), MNB (združitev), MNC (3 jedra), MND (4 jedra), družina kablov - Posrebren baker, oklopljen (spirala) in oplaščen, z možnostjo UV-laserskega tiskanja - Standard za proizvod

Aerospace series - Cables, electrical, single and multicore for general purpose - Operating temperatures between -55 °C and 200 °C - Part 012: MNA (1 core), MNB (pair), MNC (3 cores), MND (4 cores), cables family - Silver-plated copper screened (spiral) and jacketed, UV laser printable - Product standard

Luft- und Raumfahrt - Leitungen, elektrisch, ein- und mehradrig, für allgemeine Verwendung - Betriebstemperaturen zwischen -55 °C und 200 °C - Teil 012: MNA- (einadrig), MNB- (zweiadrig), MNC- (dreiadrig), MND- (vieradrig) Leitungsfamilie, mit versilbertem - Kupfergeflecht geschirmt (Umseilung) und ummantelt, UV-Laserbedruckbar - Produktnorm

Série aérospatiale - Câbles, électriques, mono et multiconducteurs d'usage general - Températures de fonctionnement comprises entre -55 °C et 200 °C - Partie 012 : MNA (1 élément), MNB (paire), MNC (tierce), MND (quarte), série de câbles multiconducteurs à blindage cuivre argenté (guipés et gainés), marquables au laser UV - Norme de produit

Ta slovenski standard je istoveten z: EN 2713-012:2022

ICS:

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

SIST EN 2713-012:2022**en,fr,de**

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EUROPEAN STANDARD

EN 2713-012

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2022

ICS 49.060

Supersedes EN 2713-012:2017

English Version

Aerospace series - Cables, electrical, single and multicore for general purpose - Operating temperatures between -55 °C and 200 °C - Part 012: MNA (1 core), MNB (pair), MNC (3 cores), MND (4 cores), cables family - Silver-plated copper screened (spiral) and jacketed, UV laser printable - Product standard

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This European Standard was approved by CEN on 8 November 2021.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, 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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European foreword

This document (EN 2713-012:2022) 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 document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2022, and conflicting national standards shall be withdrawn at the latest by August 2022.

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.

[This document supersedes EN 2713-012:2017.]

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

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EN 2713-012:2022 (E)**1 Scope**

This document specifies the characteristics of UV laser printable, single and multicore silver-plated copper screened (spiral) and jacketed electrical cables for use in the on-board electrical systems of aircraft, at operating temperatures between -55 °C and 200 °C .

It is also possible to mark these cables by qualified compatible marking. These markings are in accordance with EN 3838.

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

EN 2267-009, *Aerospace series — Cables, electrical, for general purpose — Operating temperatures between -55 °C and 260 °C — Part 009: DRA family, single and multicore assembly — Product standard*

EN 2713-002, *Aerospace series — Cables, electrical, single and multicore for general purpose - Operating temperatures between -55 °C and 200 °C — Part 002: Screened and jacketed — General*

EN 3475,* *Aerospace series — Cables, electrical, aircraft use — Test methods*

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)*

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3 Terms and definitions

<https://standards.iteh.ai/catalog/standards/sist/655e1c57-dceb-4b7e-9f04-1d283094d67d/sist-en-2713-012-2022>

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

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

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

4 Materials and construction**4.1 Materials**

These cables shall consist of the following:

- cores according to EN 2267-009;
- number of cores 1 to 4.

2 to 4-core cables shall be twisted together according to EN 2235.

Screen:

* All parts quoted in this document.

- silver-plated copper stranded spiral screen;
- for dimensions of strands, see Table 1;
- material according to EN 4434, tests according to EN 3475-100;
- construction according to EN 2235.

Outer jacket:

- Shall be defined to satisfy all required characteristics of Clause 5.

4.2 Construction

It shall be in accordance with EN 4434 and Table 1.

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Table 1

Number of cores	Code for nominal section	Nominal section mm ²	AWG ^a	Linear resistance at 20 °C	Screen strands nominal diameter	External diameter	Mass
				Ω/km max.	mm	mm max.	kg/km max.
1	001	0,15	26	160,00	0,08	1,23	4,45
	002	0,25	24	114,00	0,08	1,35	5,30
	004	0,4	22	60,00	0,08	1,49	7,16
	006	0,6	20	33,20	0,08	1,73	10,53
	010	1	18	21,10	0,08	2,00	14,90
	012	1,2	16	14,50	0,1	2,35	20,82
	020	2	14	10,90	0,1	2,66	26,54
	030	3	12	6,80	0,1	3,13	39,75
	051	5	10	4,10	0,1	3,76	60,05
2	001	0,15	26	165,00	0,08	2,07	7,96
	002	0,25	24	117,00	0,08	2,31	9,61
	004	0,4	22	61,70	0,08	2,59	13,28
	006	0,6	20	34,10	0,1	3,14	20,96
	010	1	18	21,70	0,1	3,65	29,71
	012	1,2	16	14,90	0,12	4,31	41,29
	020	2	14	11,20	0,12	4,93	53,08
3	001	0,15	26	165,00	0,08	2,20	10,75
	002	0,25	24	117,00	0,08	2,45	13,17
	004	0,4	22	61,70	0,08	2,76	18,36
	006	0,6	20	34,10	0,1	3,35	29,27
	010	1	18	21,70	0,1	3,89	42,02
	012	1,2	16	14,90	0,12	4,60	58,47
	020	2	14	11,20	0,15	5,33	78,63
4	001	0,15	26	165,00	0,08	2,41	13,54
	002	0,25	24	117,00	0,08	2,70	16,67
	004	0,4	22	61,70	0,1	3,08	24,55
	006	0,6	20	34,10	0,1	3,70	37,59
	010	1	18	21,70	0,12	4,35	55,87
	012	1,2	16	14,90	0,12	5,10	75,54

^a AWG = Closest American Wire Gauge.

4.3 Colour-coding of cores and jacket

It shall be in accordance with EN 2713-002.

5 Required characteristics

According to EN 2235 and EN 3475-100.

See Table 2.

Table 2 (1 of 3)

EN 3475-	Designation of the test	Details
201	Visual examination	Applicable, laser marked sample to be tested.
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
304	Surface resistance	Applicable
305	Overload resistance	Not applicable
306	Continuity of conductors	Applicable
401	Accelerated ageing	Applicable Temperature (230 ± 5) °C Laser marked sample to be tested.
402	Shrinkage and delamination	Applicable Temperature (230 ± 5) °C Maximum shrinkage at each end of cable: jacket: 2 mm on AWG 26 to 18; — 3 mm on AWG 16 to 10. — core insulation, see EN 2267-009.
403	Delamination and blocking	Applicable Temperature (230 ± 5) °C
404	Thermal shock	Applicable Temperature (200 ± 5) °C Maximum shrinkage at each end of cable: jacket: 2 mm on AWG 26 to 18; — 3 mm on AWG 16 to 10. — core insulation, see EN 2267-009.
405	Bending at ambient temperature	Applicable
406	Cold bend test	Applicable
407	Flammability	Applicable Extinguishing time: 3 s max.
408	Fire resistance	Not applicable

Table 2 (2 of 3)

EN 3475-	Designation of the test	Details
409	Air-excluded ageing	Not applicable
410	Thermal endurance	Not applicable
411	Resistance to fluids	Applicable, laser marked sample to be tested.
412	Humidity resistance	Not applicable
501	Dynamic cut-through	Not applicable
502	Notch propagation	Applicable Notch depth: 40 µm
503	Scrape abrasion	Applicable only on single core or circular cables. Test force on needle for cables: — 0,15 mm ² to 0,60 mm ² = 5 N — 1,00 mm ² to 1,20 mm ² = 7 N — 2,00 mm ² to 5,00 mm ² = 9 N
504	Torsion	Not applicable
505	Tensile test on conductors and strands	Applicable
506	Plating continuity	Applicable
507	Adherence of plating	Applicable
508	Plating thickness	Applicable
509	Solderability	Applicable
511	Cable-to-cable abrasion	Not applicable
512	Flexure endurance	Not applicable
601	Smoke density	Applicable
602	Toxicity	Applicable
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	Applicable
702	Screen pushback capability	Not applicable
703	Permanence of manufacturer's marking	Applicable – On cylindrical cable only Load: 1 N
704	Flexibility	Not applicable
705	Contrast measurement	Applicable K ≥ 50 %
706	Laser markability	Applicable – UV laser