

SLOVENSKI STANDARD

oSIST prEN 4641-102:2023

01-junij-2023

**Aeronautika - Kabli, optični, zunanji premer obloge 125 µm - 102. del: Poltrdi kabli
lahke izvedbe GI 62,5/125 µm, zunanji premer vlakna 1,8 mm - Standard za
proizvod**

Aerospace series - Cables, optical 125 µm outside diameter cladding - Part 102: Semi-loose 62,5/125 µm GI fibre nominal 1,8 mm outside diameter - Product standard

iTeh STANDARD PREVIEW

Luft- und Raumfahrt - Lichtwellenleiterkabel, Mantelaußendurchmesser 125 µm - Teil 102: Kompaktader, 62,5/125 µm GI-Faser, Kabelaußendurchmesser 1,8 mm - Produktnorm

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<https://standards.iteh.si/catalog/standards/4c80cf1a-37b7-4121-9582>
Série aérospatiale - Câble, optique, diamètre extérieur de la gaine optique 125 µm - Partie 102 : Câble à structure semi libre, fibre à gradient d'indice 62,5 µm/125 µm, diamètre extérieur 1,8 mm - Norme de produit

Ta slovenski standard je istoveten z: prEN 4641-102

ICS:

33.180.10	(Optična) vlakna in kabli	Fibres and cables
49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems

oSIST prEN 4641-102:2023

en,fr,de

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 4641-102

April 2023

ICS 49.060

Will supersede EN 4641-102:2009

English Version

**Aerospace series - Cables, optical 125 µm outside diameter
cladding - Part 102: Semi-loose 62,5/125 µm GI fibre
nominal 1,8 mm outside diameter - Product standard**

Série aérospatiale - Câble, optique, diamètre extérieur
de la gaine optique 125 µm - Partie 102 : Câble à
structure semi libre, fibre à gradient d'indice 62,5
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produit

Luft- und Raumfahrt - Lichtwellenleiterkabel,
Mantelaußendurchmesser 125 µm - Teil 102:
Kompaktader, 62,5/125 µm GI-Faser,
Kabelaußendurchmesser 1,8 mm - Produktnorm

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 4641-102:2023) 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 is currently submitted to the CEN Enquiry.

This document will supersede EN 4641-102:2009.

prEN 4641-102:2023 includes the following significant technical changes with respect to EN 4641-102:2009:

a) ...

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<https://standards.iteh.ai/catalog/standards/sist/4c80cf1a-37b7-4121-9582-61bef8ebe365/osist-pren-4641-102-2023>

1 Scope

This document specifies the general characteristics, conditions for qualification, acceptance and quality assurance for a fibre optic cable with a 62,5 µm/125 µm Graded Index fibre nominal, 1,8 mm outside diameter and of semi-loose buffer construction.

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 2424, *Aerospace series — Marking of aerospace products*

EN 2812, *Aerospace series — Stripping of electric cables*

EN 3745-100,* *Aerospace series — Fibres and cables, optical, aircraft use — Test methods — Part 100: General*

EN 3838, *Aerospace series — Requirements and tests on user-applied markings on aircraft electrical cables*

EN 3909, *Aerospace series — Test fluids and test methods for electrical and optical components and sub-assemblies*

EN 4641-001, *Aerospace series — Cables, optical, 125 µm diameter cladding — Part 001: Technical specification*

TR 4647,¹ *Aerospace series — Termination procedure for EN 4639 contact*

<https://standards.iteh.ai/catalog/standards/sist/4c80cf1a-37b7-4121-9582-61bef8ebe365/osist-pren-4641-102-2023>

For the purposes of this document, the terms and definitions given in EN 3745-100 apply.

ISO and IEC maintain terminology 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 Required characteristics

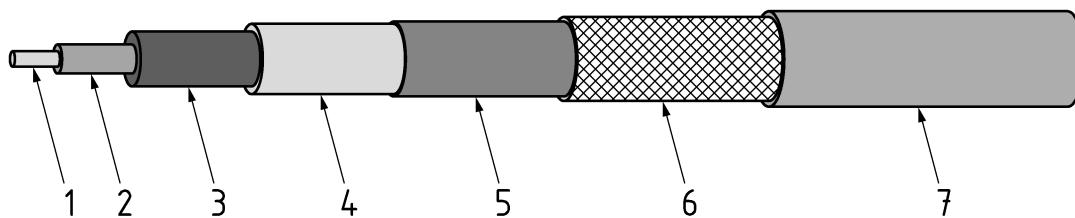
The characteristics of the cables, tested according to the methods described hereafter shall comply with the values defined in this product standard.

* And all parts quoted in this document.

¹ Published as ASD-STAN Technical Report at the date of publication of this document by AeroSpace and Defence industries Association of Europe — Standardization (ASD-STAN), <https://www.asd-stan.org/>.

5 Cable construction

See Figure 1 and Table 1.



Key

- | | |
|--------------------|----------------------|
| 1 Core | 5 Barrier (optional) |
| 2 Cladding | 6 Strength member |
| 3 Primary buffer | 7 Jacket |
| 4 Secondary buffer | |

Figure 1

Table 1

Property	STANDARD	PREVIOUS	Value
Core			(62,5 ± 3,0) µm
Cladding			(125 ± 2,0) µm
Primary coating			(245 ± 5) µm
Finished cable diameter			(1,88 ± 0,12) mm
Cable mass			≤ 4,65 g/m
Operating temperature			-65 °C to 150 °C
Attenuation at 850 nm (20 °C)			< 4 dB/km
Attenuation at 1 300 nm (20 °C)			< 2 dB/km
Numerical aperture			0,275 ± 0,015
Minimum bend radius (20 °C)			Installation: 20 mm (10 × outside diameter) Long term: 20 mm (10 × outside diameter) Storage: 40 mm (20 × cable outside diameter)
Tensile strength			> 200 N

6 Materials

See Table 2.

Table 2

Element		Material
Fibre	Core	Silica
	Cladding	
Primary coating		Polyacrylate
Secondary buffer		Polymer
Barrier layer (optional)		Polymer
Mechanical strength reinforcement		Synthetic fibres
Outer jacket		Fluoropolymer

Buffer and jacket may consist of multiple layers as long as they fulfil the requirements.

7 Test methods and performances

7.1 Tests in accordance with EN 3745-100

7.1.1 Optical fibre

See Table 3.

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 7.1 Tests in accordance with EN 3745-100
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[Table 3 — Optical fibre test methods a-37b7-4121-9582-](https://standards.iteh.ai/standard/prEN%204641-102%202023/table3)

Designation of test	Test method EN 3745-	Test conditions and results
Fibre visual examination	201	Pass
Fibre dimensions	202	Method D: core diameter: $(62,5 \pm 3) \mu\text{m}$
Optical fibre proof test	501	$> 1 \%$
Attenuation	301 Method D	Maximum attenuation $\leq 4 \text{ dB/km}$ at 850 nm , $\leq 2 \text{ dB/km}$ at $1\ 300 \text{ nm}$ at 20°C Minimum sample length: 100 m
Numerical aperture	302	Numerical aperture: $0,275 \pm 0,015$ at $\lambda = (850 \pm 20) \text{ nm}$ Sample length: 2 m
Bandwidth	303	Bandwidth $\geq 200 \text{ MHz/km}$ at 850 nm Bandwidth $\geq 600 \text{ MHz/km}$ at $1\ 300 \text{ nm}$ Number of samples: 1 Minimum sample length: 1 km Central wavelengths: $(850 \pm 10) \text{ nm}$, $(1\ 300 \pm 10) \text{ nm}$ Spectral width (-3 dB): $\leq 10 \text{ nm}$ for 850 nm and $1\ 300 \text{ nm}$

7.1.2 Fibre optic cable

See Table 4.

Table 4 — Fibre optic cable test methods (1 of 6)

Designation of test	Test method EN 3745-	Test conditions and results
Visual examination	201	The outer jacket shall have the correct identification as specified in this standard. The coating shall be continuous and free of visible defects such as lumps, abrasions, cracks, splits or blisters. Number of samples: 1 – Sample length: 3 m
Primary coating outside diameter	203	$245 \pm 5 \mu\text{m}$
Secondary Buffer diameter	203	$915 \pm 60 \mu\text{m}$
Outer jacket outside diameter	203	$1,88 \pm 0,12 \text{ mm}$
Longitudinal stability	205	Change in longitudinal dimensions between A and B: $\leq 5 \text{ mm}$ Number of samples: 3 – Sample length: $(3,5 \pm 0,03) \text{ m}$ Perform temperature cycling – Test method EN 3745-402 – 25 cycles
Attenuation	301 Method D https://standards.itih.it/catalog/standard/itih-1a-37b7-4121-9582-61bef8ebe365/	Maximum attenuation $\leq 4 \text{ dB/km}$ at 850 nm , $\leq 2 \text{ dB/km}$ at $1\ 300 \text{ nm}$ at 20°C Minimum sample length: 100 m
Cable immunity to ambient light	305	Level of optical power $\leq -50 \text{ dBm}$ Sample length exposed to light source: 10 m
Attenuation during temperature cycling	306/402	Visual examination in accordance with EN 3745-201. Maximum variation of attenuation: $\alpha \leq 0,5 \text{ dB}$ at 850 nm and $1\ 300 \text{ nm}$ Test method EN 3745-402 – 25 cycles High temperature: 150°C – Low temperature: -65°C Duration at extreme temperatures: 30 minutes Rate of change: 5°C per minute Number of samples: 3 – Sample length: 20 m
Cable accelerated aging	401	Visual examination in accordance with EN 3745-201. Maximum variation in attenuation: $< 0,5 \text{ dB}$ Maximum variation in attenuation after 24 h: $< 0,3 \text{ dB}$ Residual maximum variation in attenuation: $< 0,2 \text{ dB}$ Mandrel diameter: 250 mm Test temperature: 150°C – Number of temperature cycles: 1 Number of samples: 1 – Sample length: $(100 \pm 0,05) \text{ m}$

Table 4 — Fibre optic cable test methods (2 of 6)

Designation of test	Test method EN 3745-	Test conditions and results
Thermal shock	404	Visual examination in accordance with EN 3745-201. Maximum variation in attenuation: < 0,5 dB Maximum variation in attenuation after 24 h: < 0,3 dB Residual maximum variation in attenuation: < 0,2 dB High temperature: 150 °C – Low temperature: -65 °C Duration at extreme temperatures: 30 minutes Number of samples: 2 – Sample length: 30 m Number of temperature cycles: 10
Low/High temperature bend	405	Visual examination in accordance with EN 3745-201 Maximum variation in attenuation: $\Delta\alpha < 0,5$ dB at 850 nm and 1 300 nm High temperature: 150 °C – Low temperature: -65 °C 4-h soak at each temperature extreme Mandrel diameter: (50 ± 1) mm Cable load weight: (4,0 ± 0,2) kg Number of samples: 1 – Sample length: > 2 m
Cold bend	406	Maximum permissible variation in attenuation: $\Delta\alpha < 0,5$ dB at 850 nm and 1 300 nm Visual examination in accordance with EN 3745-201 1 h soak at: -65 °C – Mandrel diameter: (50 ± 1) mm Mandrel wraps: 10 Number of samples: 1 – Sample length: > 10 m
Flammability	407	No flaming particles shall fall from the sample during the test and the tissue paper shall not be ignited Period of flame application: 30 seconds Maximum burn length: 75 mm – Self extinguish after 5 sec Number of samples: 3 – Sample length: (1 ± 0,05) m
Thermal life	410	100 000 h at 95 °C
Resistance to fluids	411 Method 2	Visual examination in accordance with EN 3745-201 Maximum variation of weight: $\Delta m = 5$ % No cracks – Low colour modification – Readable marking See 6.2 for fluids table
Humidity resistance	412	Visual examination in accordance with EN 3745-201 Maximum residual attenuation: < 0,2 dB Maximum variation of weight: $\Delta m = 5$ % Number of samples: 1 – Sample length: 20 m Number of cycles: 15