

SLOVENSKI STANDARD

SIST EN 4641-301:2022

01-maj-2022

Nadomešča:

SIST EN 4641-301:2011

Aeronavtika - Optični kabli, premer vlakna z oklepom 125 μ m - 301. del:
Kompaktna struktura 50/125 μ m GI, imenski zunanji premer kabla 1,8 mm -
Standard za izdelek

Aerospace series - Cables, optical 125 μ m diameter cladding - Part 301: Tight structure
50/125 μ m GI, fibre nominal 1,8 mm, outside diameter - Product standard

Luft- und Raumfahrt - Lichtwellenleiterkabel, Claddingdurchmesser 125 μ m - Teil 301:
Festaderaufbau GI 50/125 μ m, Faser Kabelaußendurchmesser 1,8 mm - Produktnorm

Série aérospatiale - Câbles, optiques, diamètre extérieur de la gaine optique 125 μ m -
Partie 301 : Câble à structure serrée, fibre à gradient d'indice 50/125 μ m, diamètre
extérieur 1,8 mm - Norme de produit

<https://standards.iteh.ai/catalog/standards/sist/2401cbe0-84c2-4adc-a793-a8d8b9fac1c0/sist-en-4641-301-2022>

Ta slovenski standard je istoveten z: EN 4641-301:2022

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

SIST EN 4641-301:2022

en,fr,de

**iTeh STANDARD
PREVIEW
(standards.iteh.ai)**

SIST EN 4641-301:2022

<https://standards.iteh.ai/catalog/standards/sist/2401cbe0-84c2-4adc-a793-a8d8b9fac1c0/sist-en-4641-301-2022>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 4641-301

March 2022

ICS 49.090

Supersedes EN 4641-301:2011

English Version

**Aerospace series - Cables, optical 125 μm diameter
cladding - Part 301: Tight structure 50/125 μm GI, fibre
nominal 1,8 mm, outside diameter - Product standard**

Série aérospatiale - Câbles, optiques, diamètre
extérieur de la gaine optique 125 μm - Partie 301 :
Câble à structure serrée, fibre à gradient d'indice
50/125 μm , diamètre extérieur 1,8 mm - Norme de
produit

Luft- und Raumfahrt - Lichtwellenleiterkabel,
Claddingdurchmesser 125 μm - Teil 301:
Festaderaufbau GI 50/125 μm , Faser
Kabelaußendurchmesser 1,8 mm - Produktnorm

This European Standard was approved by CEN on 25 January 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

Contents	Page
European foreword	3
1 Scope.....	4
2 Normative references.....	4
3 Terms and definitions	4
4 Required characteristics	5
5 Cable construction.....	5
6 Materials	6
7 Test methods and performances.....	7
8 Tooling.....	13
9 Quality assurance	13
10 Designation and marking.....	14
11 Delivery conditions	14
12 Storage	15
13 Technical specification	15
Bibliography	16

SIST EN 4641-301:2022

<https://standards.iteh.ai/catalog/standards/sist/2401cbe0-84c2-4adc-a793-a8d8b9fac1c0/sist-en-4641-301-2022>

European foreword

This document (EN 4641-301:2022) 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, 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 September 2022, and conflicting national standards shall be withdrawn at the latest by September 2022.

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 4641-301:2011.

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.

ITEH STANDARD
PREVIEW
(standards.iteh.ai)

[SIST EN 4641-301:2022](https://standards.iteh.ai/catalog/standards/sist/2401cbe0-84c2-4adc-a793-a8d8b9fac1c0/sist-en-4641-301-2022)

<https://standards.iteh.ai/catalog/standards/sist/2401cbe0-84c2-4adc-a793-a8d8b9fac1c0/sist-en-4641-301-2022>

EN 4641-301:2022 (E)

1 Scope

This document specifies the general characteristics, conditions for qualification, acceptance and quality assurance for a fibre optic cable with a 50/125 μm Graded Index fibre core, 1,8 mm outside diameter for non pull-proof contact designs.

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 3475-601, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 601: Smoke density*

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

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*

3 Terms and definitions

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

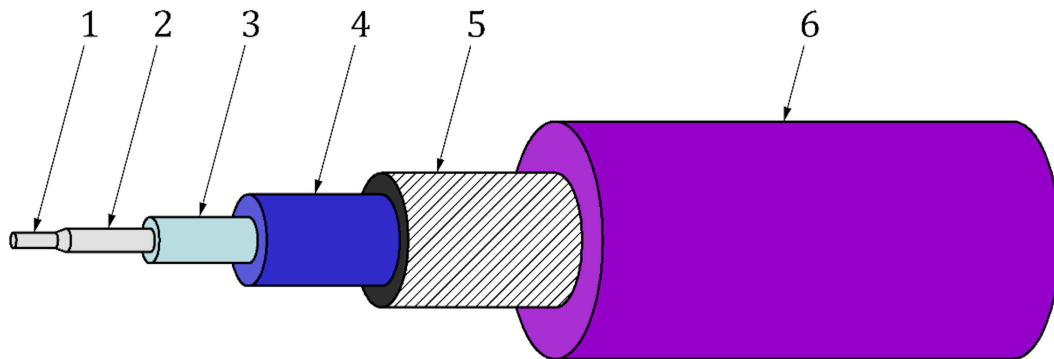
* All parts quoted in this document.

4 Required characteristics

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

5 Cable construction

See Figure 1 and Table 1.



Key

- 1 Core
- 2 Cladding
- 3 Primary buffer
- 4 Secondary buffer
- 5 Strength member
- 6 Outer jacket

iTeh STANDARD
PREVIEW
(standards.iteh.ai)

SIST EN 4641-301:2022
Figure 1 — Cable construction
<https://standards.iteh.ai/catalog/standards/sist/2401cbe0-84c2-4adc-a793-a8d8b9fac1c0/sist-en-4641-301-2022>

Table 1 — Cable dimensional information

Property	Value
Core diameter	$(50 \pm 3,0) \mu\text{m}$
Cladding diameter	$(125 \pm 2,0) \mu\text{m}$
Core/cladding concentricity	$\leq 3 \mu\text{m}$
Core non circularity	$\leq 5 \%$
Cladding non circularity	$\leq 2 \%$
Primary Buffer	$(245 \pm 15) \mu\text{m}$
Attenuation at 850 nm (+20 °C)	$\leq 5 \text{ dB/km}$
Attenuation at 1 300 nm (+20 °C)	$\leq 3 \text{ dB/km}$
Finished Cable Diameter	$(1,80 \pm 0,1) \text{ mm}$
Cable Mass	$\leq 5 \text{ kg/km}$
Operating temperature	-60 °C to 135 °C
Minimum bend radius (+20 °C)	Installation: 20 mm Long term: 20 mm Storage: 40 mm
Strength member weave pitch	$3 \text{ mm} \leq p \leq 20 \text{ mm}$
Tensile strength	$> 200 \text{ N}$

6 Materials

See Table 2.

[SIST EN 4641-301:2022](https://standards.iteh.ai/catalog/standards/sist/2401cbe0-84c2-4adc-a793-a8d8b9fac1c0/sist-en-4641-301-2022)

<https://standards.iteh.ai/catalog/standards/sist/2401cbe0-84c2-4adc-a793-a8d8b9fac1c0/sist-en-4641-301-2022>

Table 2 — Cable materials

Element		Material
Fibre	Core	Silica
	Cladding	
Primary buffer		High temperature Polyacrylate
Secondary buffer		High temperature Polymer(s)
Mechanical strength reinforcement		Aramid/aramid-fibre glass woven braid
Jacket(s)		High temperature Polymer

7 Test methods and performances

7.1 Tests in accordance with EN 3745-100.

7.1.1 Optical fibre

See Table 3.

Table 3 — Optical fibre performance requirements

Test method EN 3745-	Designation of the test	Test conditions and results
201	Visual examination	Pass
202	Fibre core dimensions	Method A: Core diameter = $(50 \pm 3) \mu\text{m}$
501	Optical fibre proof test	$> 1 \%$
202	Fibre cladding dimension	Cladding diameter: $(125 \pm 2) \mu\text{m}$ Method A or B Sample should be in accordance with test methods Number of samples: 1
203	Primary coating outside diameter	Not applicable
202	Fibre dimensions, core non-circularity	Core non circularity: $\leq 5 \%$ ($3 \mu\text{m}$) Number of samples: 1
202	Fibre dimensions, cladding non-circularity	Cladding non-circularity: $\leq 2 \%$ ($2,5 \mu\text{m}$) Number of samples: 1
202	Fibre dimensions, concentricity error	Concentricity error: $\leq 3 \mu\text{m}$ Number of samples: 1
302	Numerical aperture	Numerical aperture: $(0,2 \pm 0,015)$ at $\lambda = (850 \pm 20) \text{ nm}$ Sample length: 2 m
303	Bandwidth	Bandwidth $\geq 500 \text{ MHz/km}$ at 850 nm Bandwidth $\geq 500 \text{ MHz/km}$ at 1 300 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

7.1.2 Fibre optic cable

Fibre optic cable performance requirements.

See Table 4.

Table 4 — Fibre optic cable performance requirements (1 of 5)

Test method EN 3745-	Designation of the test	Test conditions and results
201	Visual examination	The outer jacket shall have the correct identification as specified in this standard. The outer jacket shall be continuous and free of visible defects such as lumps, abrasions, cracks, splits or blisters Number of samples: 1 Sample length: 3 m
203	Buffer diameter	$(925 \pm 75) \mu\text{m}$
203	Outer jacket outside diameter	$(1,80 \pm 0,1) \text{ mm}$
205 Method A	Longitudinal stability	Visual examination in accordance with EN 3745-201 Outer jacket shrinkage or elongation: $\leq 3,5 \text{ mm}$ Secondary buffer shrinkage or elongation: $\leq 1,5 \text{ mm}$ Sample length: 5 m Number of samples: 1 Number of temperature cycles (EN 3745-402): 25 High temperature: 135°C – Low Temperature: -60°C , Duration at extreme temperatures: 30 min Rate of change: 5°C per min
305	Cable immunity to ambient light	Level of optical power: $\Delta\alpha \leq -55 \text{ dBm}$ Sample length exposed to light source: 10 m Diameter of the integration sphere: $(10 \pm 0,1) \text{ cm}$ Spectral characteristics or colour temperature of the light source: solar spectrum Continuous spectrum between 250 nm and 1 600 nm Light temperature: 6 000 K Light intensity: 86 400 Lux Minimum authorised long-term bend radius: $(20 \pm 0,1) \text{ mm}$
306/402	Attenuation during temperature cycling	Visual examination in accordance with EN 3745-201 Maximum variation of attenuation: $\Delta\alpha \leq 0,75 \text{ dB at } 850 \text{ nm}$ Test method 402 – 10 cycles High temperature: 135°C – Low temperature: -60°C Duration at extreme temperatures: 30 min Rate of change: 5°C per min Number of samples: 3 – Sample length: 10 m