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**Aeronavtika - Kabli, optični, zunanji premer obloge vlakna 125 µm - 106. del:  
Polohlapna struktura obloge GI 62,5/125 µm, zunanji premer vlakna 0,9 mm -  
Standard za proizvod**

Aerospace series - Cables, optical, 125 µm diameter cladding - Part 106: Semi-loose structure 62,5/125 µm GI fibre nominal 0,9 mm outside diameter - Product standard

Luft- und Raumfahrt - Lichtwellenleiterkabel, Mantelaußendurchmesser 125 µm - Teil 106: Kompaktader, 62,5/125 µm GI-Faser, Kabelaußendurchmesser 0,9 mm - Produktnorm

Série aérospatiale - Câbles optiques, diamètre extérieur de la gaine optique 125 µm - Partie 106 : Câble à structure semi-libre fibre à gradient d'indice 62,5/125 µm, diamètre extérieur 0,9 mm - Norme de produit

**Ta slovenski standard je istoveten z: EN 4641-106:2018**

**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 4641-106:2019**

**en,fr,de**

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SIST EN 4641-106:2019

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EUROPEAN STANDARD

**EN 4641-106**

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2018

ICS 49.090

English Version

**Aerospace series - Cables, optical, 125  $\mu\text{m}$  diameter  
cladding - Part 106: Semi-loose structure 62,5/125  $\mu\text{m}$  GI  
fibre nominal 0,9 mm outside diameter - Product standard**

Série aérospatiale - Câbles, optiques, diamètre  
extérieur de la gaine optique 125  $\mu\text{m}$  - Partie 106 :  
Câble à structure semi-libre, fibre à gradient d'indice  
62,5/125  $\mu\text{m}$ , diamètre extérieur 0,9 mm - Norme de  
produit

Luft- und Raumfahrt - Lichtwellenleiterkabel,  
Mantelaußendurchmesser 125  $\mu\text{m}$  - Teil 106:  
Kompaktader, 62,5/125  $\mu\text{m}$  GI-Faser,  
Kabelaußendurchmesser 0,9 mm - Produktnorm

This European Standard was approved by CEN on 8 July 2018.

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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 4641-106:2018) 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 May 2019, and conflicting national standards shall be withdrawn at the latest by May 2019.

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.

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 United Kingdom.

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**EN 4641-106:2018 (E)****1 Scope**

This European Standard specifies the general characteristics, conditions for qualification, acceptance and quality assurance for a fibre optic cable with a 62,5/125 µm, MM fibre core, and 900 µm outside cable diameter and of semi-loose buffer construction for “inside avionics box” equipment fibre harnessing.

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

EN 3745 (all parts), *Aerospace series — Fibres and cables, optical, aircraft use — Test methods*

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, *Aerospace series — Termination procedure for EN 4639 optical contact*<sup>1)</sup>

**3 Terms and definitions**

SIST EN 4641-106:2019

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For the purposes of this document, the following terms and definitions given in EN 3745-100 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 Required characteristics**

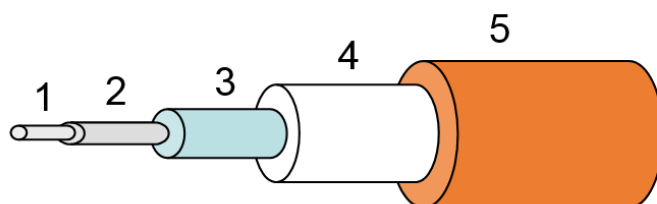
The characteristics of the cables, tested according to the methods described hereafter shall comply with the values defined in this product standard.

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1) Published as ASD-STAN Technical Report at the date of publication of this European Standard by Aerospace and Defence Industries Association of Europe-Standardization (ASD-STAN), ([www.asd-stan.org](http://www.asd-stan.org)).

## 5 Cable construction

See Figure 1 and Table 1.



### Key

- 1 Core
- 2 Cladding
- 3 Primary buffer
- 4 Secondary buffer
- 5 Cable jacket

Figure 1

Table 1

| Property  | Value   |
|---|---|
| Core  | $(62,5 \pm 3,0) \mu\text{m}$  |
| Cladding  | $(125 \pm 2,0) \mu\text{m}$   |
| Primary coating                                     | $(250 \pm 10) \mu\text{m}$  |
| Finished cable diameter                             | $(915 \pm 60) \mu\text{m}$  |
| Cable mass  | $\leq 1,3 \text{ g/m}$  |
| Operating temperature                               | $-65 \text{ }^\circ\text{C}$ to $150 \text{ }^\circ\text{C}$                          |
| Numerical aperture                                  | $0,275 \pm 0,015$   |
| Minimum bend radius ( $20 \text{ }^\circ\text{C}$ ) | Installation: 4 mm<br>Long term: 6 mm<br>Storage: 18 mm (20 x cable outside diameter) |
| Fibre tensile strength                              | $> 200 \text{ N}$   |

## 6 Materials

See Table 2.

Table 2

| Element          |          | Material     |
|------------------|----------|--------------|
| Fibre            | Core     | Silica       |
|                  | Cladding |              |
| Primary buffer   |          | Polyacrylate |
| Secondary buffer |          | PTFE         |
| Jacket(s)        |          | Polyimide    |

## 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<br>EN 3745- | Designation of test                      | Test conditions and results  |
|-------------------------|--|--|
| 201                     | Fibre visual examination                 | Pass   |
| 202                     | Fibre core dimensions                    | Method D: Core diameter: $(62,5 \pm 3) \mu\text{m}$  |
| 501                     | Optical fibre proof test                 | $> 1 \%$   |
| 202                     | Fibre cladding dimension                 | Cladding diameter: $(125 \pm 2) \mu\text{m}$<br>Method A or B<br>Sample should be in accordance with test methods<br>Number of sample: 1   |
| 203                     | Primary coating outside diameter         | Not applicable   |
| 202                     | Fibre dimension core non circularity     | Core non circularity: $\leq 5 \%$ ( $3 \mu\text{m}$ )<br>Number of sample: 1   |
| 202                     | Fibre dimension cladding non circularity | $\leq 1,0 \%$<br>Number of sample: 1   |
| 202                     | Fibre dimension concentricity error      | $\leq 1,5 \mu\text{m}$<br>Number of sample: 1  |
| 301<br>Method D         | Fibre attenuation                        | At $20 \text{ }^\circ\text{C}$<br>$\leq 3,2 \text{ dB/km}$ at $850 \text{ nm}$<br>$\leq 0,7 \text{ dB/km}$ at $1\,300 \text{ nm}$<br>Minimum sample length: $100 \text{ m}$  |
| 302                     | Numerical aperture                       | Numerical aperture:<br>$0,275 \pm 0,015$ at $\lambda = (850 \pm 20) \text{ nm}$<br>Sample length: $2 \text{ m}$  |
| 303                     | Bandwidth                                | Bandwidth $\geq 200 \text{ MHz/km}$ at $850 \text{ nm}$<br>Bandwidth $\geq 500 \text{ MHz/km}$ at $1\,300 \text{ nm}$<br>Number of samples: 1<br>Minimum sample length: $1 \text{ km}$<br>Central wavelengths: $(850 \pm 10) \text{ nm}$ , $(1\,300 \pm 10) \text{ nm}$<br>Spectral width ( $-3 \text{ dB}$ ): $\leq 10 \text{ nm}$ for $850 \text{ nm}$ and $1\,300 \text{ nm}$ |



## 7.1.2 Fibre optic cable

See Table 4.

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

| Test method<br>EN 3745- | Designation of test                    | Test conditions and results   |
|-------------------------|--|---|
| 201                     | Visual inspection                      | The cable outer layer shall be continuous and free of visible defects such as lumps, abrasions, cracks, splits or blisters.<br>Number of sample: 1.<br>Sample length: 3 m.  |
| 203                     | Buffer diameter                        | (250 ± 10) µm   |
| 203                     | Outer jacket outside diameter          | (915 ± 60) µm   |
| 205<br>Method A         | Longitudinal stability                 | Change in longitudinal dimensions between A and B: ≤ 7 mm.<br>Sample length: (2,0 ± 0,03) m<br>Number of samples: 3<br>Number of temperature cycles (EN 3745-402): 25.  |
| 301<br>Method D         | Cable attenuation                      | Maximum attenuation ≤ 3,2 dB/km at 850 nm, ≤ 0,7 dB/km at 1 300 nm at 20 °C.<br>Minimum sample length: ≥ 100 m  |
| 305                     | Cable immunity to ambient light        | Not applicable due to installation application  |
| 306/402                 | Attenuation during temperature cycling | Visual examination in accordance with EN 3745-201<br>$\alpha \leq 0,25$ dB at 850 nm and 1 300 nm.<br>Test method EN 3745-402 – 10 cycles<br>High temperature: 150 °C – Low temperature: – 65 °C<br>Duration at extreme temperatures: 30 min<br>Rate of change: 5 °C per min<br>Number of samples: 3 – Sample length: 5 m   |
| 401                     | Cable accelerated aging                | Visual examination in accordance with EN 3745-201<br>$\alpha \leq 0,25$ dB at 850 nm and 1 300 nm.<br>Variation in attenuation after 24 h: ≤ 0,25 dB<br>Residual variation in attenuation: ≤ 0,25 dB<br>Mandrel diameter: 18 mm<br>Test temperature: 150 °C – Number of temperature cycles: 1<br>Number of samples: 1 – Sample length: (3,00 ± 0,05) m                    |
| 404                     | Thermal shock                          | Visual examination in accordance with EN 3745-201<br>Permissible variation in attenuation during test sequence and after 24h: $\Delta\alpha \leq 0,25$ dB at 850 nm and 1 300 nm.<br>High temperature: 150 °C<br>Low temperature: – 65 °C<br>Duration at extreme temperatures: 30 min<br>Number of samples: 3<br>Sample length: ≥ 5 m<br>Number of temperature cycles: 10 |