SLOVENSKI STANDARD
SIST EN 4532:2009

01-maj-2009

Aeronavtika - Kabli, optiļ ni, enoģilno vlakno 200 Õm/280 Õm, zunanji premer 2,5 mm - Tehniļ na specifikacija

Aerospace series - Cables, optical, single core 200 µm/280 µm fibre, 2,5 mm outer jacket - Technical specification

Luft- und Raumfahrt - LWL-Kabel, 200 µm/280 µm Faser, 2,5 mm Aussendurchmesser - Technische Lieferbedingungen

Série aérospatiale - Câbles, optiques, fibre 200 µm/280 µm, diamètre extérieur 2,5 mm - Spécification technique

Ta slovenski standard je istoveten z: **EN 4532:2009**

ICS:

49.060	Letalska in vesoljska elektriļ na oprema in sistemi	Aerospace electric equipment and systems

SIST EN 4532:2009 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4532

February 2009

ICS 49.060

English Version

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

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Foreword

This document (EN 4532:2009) 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of an identical text or by endorsement, at the latest by August 2009, and conflicting national standards shall be withdrawn at the latest by August 2009.

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1 Scope

This standard covers two cable types, Type A and Type B.

Type A, jacketed fibre, is intended for printed circuit board inter-connection applications inside equipment.

Type B, single core, is intended for general airframe and equipment inter-connection cable suitable for installation in all aircraft locations, with exception of power plant compartments.

These cables are particularly suitable for use in military aircraft as well as for general civil aircraft applications.

2 Normative references

The following referenced documents are indispensable for the application 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 2591-306, *Aerospace series — Elements of electrical and optical connection — Test methods — Part 306: Mould growth*

EN 2591-316, *Aerospace series — Elements of electrical and optical connection — Test methods — Part 316: Ozone resistance*

EN 3733-001, *Aerospace series — Connector, optical , circular, single channel, coupled by self-locking ring, operating temperature up to 150 °C continuous — Part 001: Technical specification* [1)]

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

ISO 1817, *Rubber, vulcanized — Determination of the effect of liquids*

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

IEC 60793-1-1, *Optical fibres — Part 1-1: Measurement methods and test procedures — General and guidance*

IEC 60794-1-2, *Optical fibre cables — Part 1-2: Generic specification — Basic optical cable test procedures*

IEC 60874-1, *Connectors for optical fibres and cables — Part 1: Generic specification*

MIL-HDBK-454B, *General guidelines for electronic equipment*

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* And all applicable parts quoted.

1) Published as ASD Prestandard at the date of publication of this standard.

3 Terms and definitions

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

3.1
batch of fibre
a batch of fibre is defined as a continuous pull from a single identifiable preform

3.2
batch of cable
a batch of cable is defined as all cable arising from one continuous extrusion and stranding operation on fibre from a single batch

4 Description

4.1 Construction of type 'A' primary fibre (Jacketed fibre)

The cable shall consist of a single, step-index, multimode, all silica fibre (pure silica core with sufficiently high OH content to meet nuclear radiation hardening requirements) and suitably doped silica cladding which is protected by a primary coating. The cable shall have a tight buffer, all dielectric (non-conducting) construction and have an operating temperature range of – 60 °C to 150 °C. The primary fibre shall consist of core, cladding and primary coating. For a cable end view and side view drawing (3rd angle), see Figure 1.

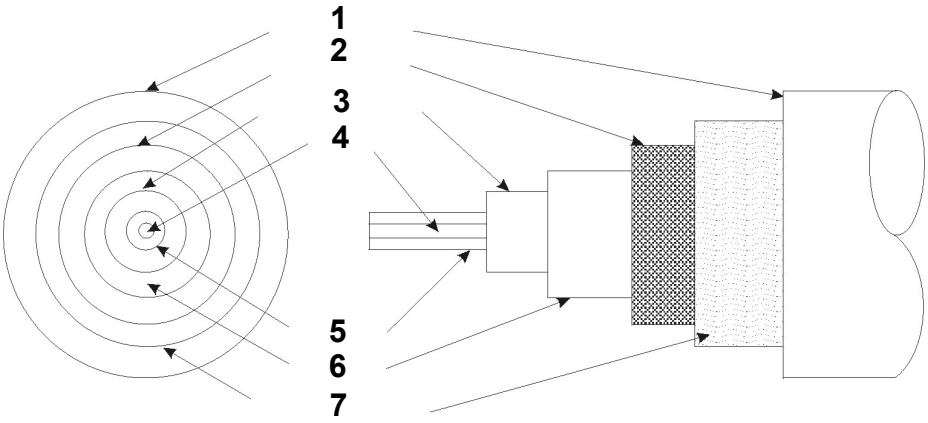
Key

1 Buffer
2 Primary coating
3 Cladding
4 Core
5 Refractive index

Figure 1 — Construction of type 'A' primary fibre

4.2 Construction of type 'B' single core cable

The cable shall consist of a single, step-index, multimode, all silica fibre (pure silica core with sufficiently high OH content to meet nuclear radiation hardening requirements) and suitably doped silica cladding which is protected by a primary coating. The cable shall have a tight buffer, all dielectric (non-conducting) construction, with strength members and outer sheath, and have an operating temperature range of – 60 °C to 150 °C. The cable shall comprise an outer sheath, strength member, inner sheath, buffer, and fibre, which is protected by a primary coating. For a cable end view and side view drawing (3rd angle), see Figure 2.



Key

1 Outer sheath
2 Inner sheath
3 Primary coating
4 Core
5 Cladding
6 Buffer
7 Strength member

Figure 2 — Construction of type 'B' cable

5 Cable characteristics

5.1 Optical performance of cable

5.1.1 Optical isolation of cable jacketing

The cable jacketing shall provide sufficient optical isolation so that any possible ambient light pick up is not more than 1 nW over a length characteristic for the installed fibre-optic network.

5.1.2 Useful installed lifetime

The useful installed lifetime shall be ≥ 25 years.

5.1.3 Mean time between failure (MTBF)

Cable failure rate of 0,02/100 m over 25 years life.

5.2 Construction data of cable (Type B)

5.2.1 Sheath colour

The sheath shall be coloured light violet.

5.2.2 Cable design

Tight buffer, all dielectric construction with strength members suitable for single connectors.

5.3 Mechanical characteristics of cable (Type B)

Minimum cable bend radius:

— during installation: ≥ 12 mm;

— installed long term (≥ 25 years): 30 mm.

The installed cable shall have this narrow bending radius only over shorter distances, which shall add up to a total of not more than 200 mm per individual light path.

6 Fibre characteristics

6.1 Optical and material data of primary fibre

6.1.1 Fibre type

All silica, step index exponent g > 30, multimode.

Deviation from ideal step index profile at a relative core diameter of 0,90 shall be less than 4 % of refractive index difference $n_{co} - n_{cl}$.

In the case of a structured cladding, the region adjacent to the core shall be a homogeneous cladding having an outer diameter of at least $1{,}15 \times D_{core}$, wherein the refractive index variation $n_{max.} - n_{min.}$ is $\leq 14 \times 10^{-4}$.

6.1.2 Refractive index difference of core/cladding

Test method according to IEC 60793-1-A1A. Refractive index difference between core/cladding $N_{co} - N_{cl} = (20 \pm 1{,}2) \times 10^{-3}$ at a wavelength of 633 nm; this value refers to the mean value of N_{cl} in the depressed cladding. Step index g-factor g > 30. Outer diameter of inner cladding: $D_{Dinn.cladd} \geq 1{,}15 \times D_{core}$. Refractive index homogeneity of inner cladding: $n_{max.} - n_{min.} < 14 \times 10^{-4}$.

6.1.3 Numerical aperture (Theoretical)

Defined by $n_{co} - n_{cl}$ based on a refractive index for pure silica, with high OH content, of 1,4571 at a wavelength of 633 nm (Helium neon laser).

$NA_{theor} = 0{,}24 \pm 0{,}01$.

6.1.4 Fibre core material composition

The optical fibre is to be pure silica undoped. The UV-absorption of the fibre shall be measured close to absorption edge, using cut back technique with:

— fibre length = 4 m cut back to 1 m length,

— source $\lambda = (220 \pm 5)$ nm,

— $\alpha < 6{,}0$ dB/m.

6.1.5 Cladding material composition

The cladding material shall be suitable doped silica. Material analysis by micro probe or corresponding x-ray analysis.