



# SLOVENSKI STANDARD SIST EN 60793-2-10:2018

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**Optična vlakna - 2-10. del: Specifikacije izdelka - Področna specifikacija za mnogorodovna vlakna kategorije A1 (IEC 60793-2-10:2017)**

Optical fibres - Part 2-10: Product specifications - Sectional specification for category A1 multimode fibres (IEC 60793-2-10:2017)

Lichtwellenleiter - Teil 2-10: Produktspezifikationen - Rahmenspezifikation für Mehrmodenfasern der Kategorie A1 (IEC 60793-2-10:2017)

Fibres optiques - Partie 2-10: Spécifications de produits - Spécification intermédiaire pour les fibres multimodales de catégorie A1 (IEC 60793-2-10:2017)

**Ta slovenski standard je istoveten z: EN 60793-2-10:2017**

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33.180.10 (Optična) vlakna in kabli Fibres and cables

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EUROPEAN STANDARD

**EN 60793-2-10**

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2017

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Supersedes EN 60793-2-10:2016

English Version

**Optical fibres - Part 2-10: Product specifications - Sectional  
specification for category A1 multimode fibres  
(IEC 60793-2-10:2017)**

Fibres optiques - Partie 2-10: Spécifications de produits -  
Spécification intermédiaire pour les fibres multimodales de  
catégorie A1  
(IEC 60793-2-10:2017)

Lichtwellenleiter - Teil 2-10: Produktspezifikationen -  
Rahmenspezifikation für Mehrmodenfasern der Kategorie  
A1  
(IEC 60793-2-10:2017)

This European Standard was approved by CENELEC on 2017-09-14. CENELEC 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.

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SIST EN 60793-2-10:2018

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

**EN 60793-2-10:2017****European foreword**

The text of document 86A/1771/CDV, future edition 6 of IEC 60793-2-10, prepared by SC 86A "Fibres and cables" of IEC/TC 86 "Fibre optics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60793-2-10:2017.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2018-06-14
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2020-09-14

This document supersedes EN 60793-2-10:2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

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The text of the International Standard IEC 60793-2-10:2017 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated

IEC 61280-1-4	NOTE	Harmonized as EN 61280-1-4.
IEC 61280-1-3	NOTE	Harmonized as EN 61280-1-3.
IEC 60794-1-1	NOTE	Harmonized as EN 60794-1-1.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60793-1-20	-	Optical fibres - Part 1-20: Measurement methods and test procedures - Fibre geometry	EN 60793-1-20	-
IEC 60793-1-21	-	Optical fibres -- Part 1-21: Measurement methods and test procedures - Coating geometry	EN 60793-1-21	-
IEC 60793-1-22	-	Optical fibres -- Part 1-22: Measurement methods and test procedures - Length measurement	EN 60793-1-22	-
IEC 60793-1-30	-	Optical fibres -- Part 1-30: Measurement methods and test procedures - Fibre proof test	EN 60793-1-30	-
IEC 60793-1-31	-	Optical fibres -- Part 1-31: Measurement methods and test procedures - Tensile strength	EN 60793-1-31	-
IEC 60793-1-32	-	Optical fibres -- Part 1-32: Measurement methods and test procedures - Coating strippability	EN 60793-1-32	-
IEC 60793-1-33	-	Optical fibres - Part 1-33: Measurement methods and test procedures - Stress corrosion susceptibility	EN 60793-1-33	-
IEC 60793-1-34	-	Optical fibres -- Part 1-34: Measurement methods and test procedures - Fibre curl	EN 60793-1-34	-
IEC 60793-1-40	-	Optical fibres -- Part 1-40: Measurement methods and test procedures - Attenuation	EN 60793-1-40	-
IEC 60793-1-41	-	Optical fibres -- Part 1-41: Measurement methods and test procedures - Bandwidth	EN 60793-1-41	-
IEC 60793-1-42	-	Optical fibres -- Part 1-42: Measurement methods and test procedures - Chromatic dispersion	EN 60793-1-42	-
IEC 60793-1-43	-	Optical fibres - Part 1-43: Measurement methods and test procedures - Numerical aperture measurement	EN 60793-1-43	-
IEC 60793-1-46	-	Optical fibres -- Part 1-46: Measurement methods and test procedures - Monitoring of changes in optical transmittance	EN 60793-1-46	-

**EN 60793-2-10:2017**

IEC 60793-1-47	-	Optical fibres -- Part 1-47: Measurement methods and test procedures - Macrobending loss	EN 60793-1-47	-
IEC 60793-1-49	-	Optical fibres -- Part 1-49: Measurement methods and test procedures - Differential mode delay	EN 60793-1-49	-
IEC 60793-1-50	-	Optical fibres - Part 1-50: Measurement methods and test procedures - Damp heat (steady state) tests	EN 60793-1-50	-
IEC 60793-1-51	-	Optical fibres - Part 1-51: Measurement methods and test procedures - Dry heat (steady state) tests	EN 60793-1-51	-
IEC 60793-1-52	-	Optical fibres - Part 1-52: Measurement methods and test procedures - Change of temperature tests	EN 60793-1-52	-
IEC 60793-1-53	-	Optical fibres - Part 1-53: Measurement methods and test procedures - Water immersion tests	EN 60793-1-53	-
IEC 60793-2	2015	Optical fibres - Part 2: Product specifications - General	EN 60793-2	2016
IEC 61280-4-1	2009	Fibre optic communication subsystem test procedures -- Part 4-1: Installed cable plant - Multimode attenuation measurement	EN 61280-4-1	2009

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

[SIST EN 60793-2-10:2018](https://standards.iteh.ai/catalog/standards/sist/6329e602-546e-441b-abee-a683e3a6e915/sist-en-60793-2-10-2018)

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IEC 60793-2-10

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# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Optical fibres – iTeh STANDARD PREVIEW**  
**Part 2-10: Product specifications – Sectional specification for category**  
**A1 multimode fibres** (standards.iteh.ai)

**Fibres optiques –** [SIST EN 60793-2-10:2018](https://standards.iteh.ai/catalog/standards/sist/6329e602-546e-441b-abee-6329e602-546e-441b-abee-6329e602-546e-441b-abee)  
**Partie 2-10: Spécifications de produits – Spécification intermédiaire pour les**  
**fibres multimodales de catégorie A1**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## OPTICAL FIBRES –

**Part 2-10: Product specifications –  
Sectional specification for category A1 multimode fibres**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60793-2-10 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This sixth edition cancels and replaces the fifth edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) addition of model A1a.4 fibre which supports single wavelength or multi-wavelength transmission systems in the vicinity of 850 nm to 950 nm.

The text of this standard is based on the following documents:

CDV	Report on voting
86A/1771/CDV	86A/1794/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60793 series, published under the general title *Optical fibres*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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## OPTICAL FIBRES –

### Part 2-10: Product specifications – Sectional specification for category A1 multimode fibres

#### 1 Scope

This part of IEC 60793 is applicable to optical fibre sub-categories A1a, A1b, and A1d. These fibres are used or can be incorporated in information transmission equipment and optical fibre cables.

Sub-category A1a applies to 50/125  $\mu\text{m}$  graded index fibre. Four bandwidth grades are defined as models A1a.1, A1a.2, A1a.3 and A1a.4. Each of these bandwidth grades is defined for two levels of macrobend loss performance that are distinguished by "a" or "b" suffix. Those models with suffix "a" are specified to meet traditional macrobend loss performance levels. Those models with suffix "b" are specified to meet enhanced macrobend loss (i.e. lower loss) performance levels. Model A1a.4 supports single wavelength or multi-wavelength transmission systems in the vicinity of 850 nm to 950 nm.

Sub-category A1b applies to 62,5/125  $\mu\text{m}$  graded index fibre and sub-category A1d applies to 100/140  $\mu\text{m}$  graded index fibre.

Other applications include, but are not restricted to, the following: short reach, high bit-rate systems in telephony, distribution and local networks carrying data, voice and/or video services; on-premises intra-building and inter-building fibre installations including data centres, local area networks (LANs), storage area networks (SANs), private branch exchanges (PBXs), video, various multiplexing uses, outside telephone cable plant use, and miscellaneous related uses.

Three types of requirements apply to these fibres:

- general requirements, as defined in IEC 60793-2;
- specific requirements common to the category A1 multimode fibres covered in this document and which are given in Clause 5;
- particular requirements applicable to individual fibre sub-categories and models, or specific applications, which are defined in the normative specification annexes.

#### 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.

IEC 60793-1-20, *Optical fibres – Part 1-20: Measurement methods and test procedures – Fibre geometry*

IEC 60793-1-21, *Optical fibres – Part 1-21: Measurement methods and test procedures – Coating geometry*

IEC 60793-1-22, *Optical fibres – Part 1-22: Measurement methods and test procedures – Length measurement*

IEC 60793-1-30, *Optical fibres – Part 1-30: Measurement methods and test procedures – Fibre proof test*

IEC 60793-1-31, *Optical fibres – Part 1-31: Measurement methods and test procedures – Tensile strength*

IEC 60793-1-32, *Optical fibres – Part 1-32: Measurement methods and test procedures – Coating strippability*

IEC 60793-1-33, *Optical fibres – Part 1-33: Measurement methods and test procedures – Stress corrosion susceptibility*

IEC 60793-1-34, *Optical fibres – Part 1-34: Measurement methods and test procedures – Fibre curl*

IEC 60793-1-40, *Optical fibres – Part 1-40: Measurement methods and test procedures – Attenuation*

IEC 60793-1-41, *Optical fibres – Part 1-41: Measurement methods and test procedures – Bandwidth*

IEC 60793-1-42, *Optical fibres – Part 1-42: Measurement methods and test procedures – Chromatic dispersion*

IEC 60793-1-43, *Optical fibres – Part 1-43: Measurement methods and test procedures – Numerical aperture measurement*

IEC 60793-1-46, *Optical fibres – Part 1-46: Measurement methods and test procedures – Monitoring of changes in optical transmittance*

IEC 60793-1-47, *Optical fibres – Part 1-47: Measurement methods and test procedures – Macrobending loss*

IEC 60793-1-49, *Optical fibres – Part 1-49: Measurement methods and test procedures – Differential mode delay*

IEC 60793-1-50, *Optical fibres – Part 1-50: Measurement methods and test procedures – Damp heat (steady state) tests*

IEC 60793-1-51, *Optical fibres – Part 1-51: Measurement methods and test procedures – Dry heat (steady state) tests*

IEC 60793-1-52, *Optical fibres – Part 1-52: Measurement methods and test procedures – Change of temperature tests*

IEC 60793-1-53, *Optical fibres – Part 1-53: Measurement methods and test procedures – Water immersion tests*

IEC 60793-2:2015, *Optical fibres – Part 2: Product specifications – General*

IEC 61280-4-1:2009, *Fibre-optic communication subsystem test procedures – Part 4-1: Installed cable plant – Multimode attenuation measurement*

### 3 Terms, definitions

No terms and definitions are listed in this document.

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 Abbreviated terms

CPR	coupled power ratio
DMD	differential mode delay
EF	encircled flux

EMB	effective modal bandwidth
EMB <sub>c</sub>	calculated effective modal bandwidth
LAN	local area network
MMF	multimode fibre
NA	numerical aperture
OFL	overfilled launch
OMB <sub>c</sub>	overfilled launch modal bandwidth calculated from differential mode delay (also known as OFL <sub>c</sub> )
PBX	private branch exchange
PMD	physical medium dependent
ROFL	radial overfilled launch
SAN	storage area network

## 5 Specifications

### 5.1 General

The fibre consists of a glass core with a graded index profile and a glass cladding in accordance with IEC 60793-2:2015, 5.1.

The term "glass" usually refers to material consisting of non-metallic oxides.

### 5.2 Dimensional requirements

Dimensional attributes and measurement methods are given in Table 1.

Requirements common to all fibres in category A1 are indicated in Table 2.

Table 3 lists additional attributes that shall be specified by each sub-category specification.

**Table 1 – Dimensional attributes and measurement methods**

Attributes	Measurement methods
Cladding diameter	IEC 60793-1-20
Core diameter <sup>a, b</sup>	IEC 60793-1-20
Cladding non-circularity	IEC 60793-1-20
Core non-circularity	IEC 60793-1-20
Core-cladding concentricity error	IEC 60793-1-20
Primary coating diameter	IEC 60793-1-21
Primary coating non-circularity	IEC 60793-1-21
Primary coating-cladding concentricity error	IEC 60793-1-21
Fibre length	IEC 60793-1-22
<sup>a</sup> Core diameter is specified at 850 nm ± 10 nm with a test specimen length of 2,0 m ± 0,2 m and a threshold value, $k_{\text{CORE}}$ , of 0,025 for A1 fibres except A1a.1b/2b/3b/4b fibres.	
<sup>b</sup> Core diameter is specified at 850 nm ± 10 nm with a test specimen length of 100 m ± 5 % and a threshold value, $k_{\text{CORE}}$ , of 0,025 for A1a.1b/2b/3b/4b fibres.	