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STN	**Optické vlákna** **Časť 1-41: Metódy merania a skúšobné postupy** **Šírka pásma**	**STN** **EN IEC** **60793-1-41** 35 9213

Optical fibres - Part 1-41: Measurement methods and test procedures - Bandwidth

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 08/24

Obsahuje: EN IEC 60793-1-41:2024, IEC 60793-1-41:2024

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60793-1-41

May 2024

ICS 33.180.10

Supersedes EN 60793-1-41:2010

English Version

Optical fibres - Part 1-41: Measurement methods and test procedures - Bandwidth (IEC 60793-1-41:2024)

Fibres optiques - Partie 1-41: Méthodes de mesure et procédures d'essai - Largeur de bande (IEC 60793-1-41:2024)

Lichtwellenleiter - Teil 1-41: Messmethoden und Prüfverfahren - Bandbreite (IEC 60793-1-41:2024)

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 60793-1-41:2024 E

EN IEC 60793-1-41:2024 (E)

European foreword

The text of document 86A/2302/CDV, future edition 4 of IEC 60793-1-41, 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 IEC 60793-1-41:2024.

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) 2025-02-24
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2027-05-24

This document supersedes EN 60793-1-41:2010 and all of its amendments and corrigenda (if any).

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.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60793-1-41:2024 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 standard indicated:

IEC 60793-2-10	NOTE	Approved as EN IEC 60793-2-10
IEC 60793-2-30	NOTE	Approved as EN 60793-2-30
IEC 60793-2-40	NOTE	Approved as EN IEC 60793-2-40
IEC 61280-4-1	NOTE	Approved as EN IEC 61280-4-1
IEC 60793-1-42	NOTE	Approved as EN 60793-1-42
IEC 60793-1-1	NOTE	Approved as EN IEC 60793-1-1
IEC 60793-1-22	NOTE	Approved as EN 60793-1-22

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 Where 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.cencenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60793-1-20	-	Optical fibres - Part 1-20: Measurement methods and test procedures - Fibre geometry	EN 60793-1-20	-
IEC 60793-1-43	-	Optical fibres - Part 1-43: Measurement methods and test procedures - Numerical aperture measurement	EN 60793-1-43	-
IEC 60793-1-49	-	Optical fibres - Part 1-49: Measurement methods and test procedures - Differential mode delay	EN IEC 60793-1-49	-

IEC 60793-1-41

Edition 4.0 2024-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Part 1-41: Measurement methods and test procedures – Bandwidth

Fibres optiques –
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IEC 60793-1-41:2024-04(en-fr)

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INTERNATIONAL STANDARD

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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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IEC 60793-1-41 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2010. This edition constitutes a technical revision.

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

a) the addition of a direct reference for method A and method B.

The text of this International Standard is based on the following documents:

Draft	Report on voting
86A/2302/CDV	86A/2365/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts of the IEC 60793 series, published under the general title *Optical fibres – Measurement methods and test procedures*, 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

OPTICAL FIBRES –

Part 1-41: Measurement methods and test procedures – Bandwidth

1 Scope

This part of IEC 60793 describes three methods for determining and measuring the modal bandwidth of multimode optical fibres (see IEC 60793-2-10, IEC 60793-2-30, and the IEC 60793-2-40 series). The baseband frequency response is directly measured in the frequency domain by determining the fibre response to a sinusoidaly modulated light source. The baseband response can also be measured by observing the broadening of a narrow pulse of light. The calculated response is determined using differential mode delay (DMD) data. The three methods are:

- Method A – Time domain (pulse distortion) measurement
- Method B – Frequency-domain measurement
- Method C – Overfilled launch modal bandwidth calculated from differential mode delay (OMBc)

Method A and method B can be performed using one of two launches: an overfilled launch (OFL) condition or a restricted mode launch (RML) condition. Method C is only defined for A1-OM3 to A1-OM5 multimode fibres and uses a weighted summation of DMD launch responses with the weights corresponding to an overfilled launch condition. The relevant test method and launch condition is chosen according to the type of fibre.

NOTE 1 These test methods are commonly used in production and research facilities and are not easily accomplished in the field.

NOTE 2 OFL has been used for the modal bandwidth value for LED-based applications for many years. However, no single launch condition is representative of the laser (e.g. VCSEL) sources that are used for gigabit and higher rate transmission. This fact drove the development of IEC 60793-1-49 for determining the effective modal bandwidth of laser optimized 50 µm fibres. See IEC 60793-2-10 and IEC 61280-4-1 for more information.

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

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