

SLOVENSKI STANDARD SIST EN IEC 60793-1-40:2019

01-julij-2019

Nadomešča:

SIST EN 60793-1-40:2004

Optična vlakna - 1-40. del: Metode merjenja slabljenja (IEC 60793-1-40:2019)

Optical fibres - Part 1-40: Attenuation measurement methods (IEC 60793-1-40:2019)

Lichtwellenleiter - Teil 1-40: Messmethoden und Prüfverfahren - Dämpfung (IEC 60793-1 -40:2019)

iTeh STANDARD PREVIEW

Fibres optiques - Partie 1-40: Méthodes de mesure et procédures d'essai - Affaiblissement (IEC 60793-1-40:2019)

SIST EN IEC 60793-1-40:2019

https://standards.iteh.ai/catalog/standards/sist/ccef22fe-d40c-442f-8f6a-Ta slovenski standard je istoveten z:c/sist-eEN_IEC_60793_1_40:2019

ICS:

33.180.10 (Optična) vlakna in kabli Fibres and cables

SIST EN IEC 60793-1-40:2019 en

SIST EN IEC 60793-1-40:2019

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN IEC 60793-1-40:2019
https://standards.iteh.ai/catalog/standards/sist/ccef22fe-d40c-442f-8f6a-cde88d8e82ac/sist-en-iec-60793-1-40-2019

EUROPEAN STANDARD

EN IEC 60793-1-40

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2019

ICS 33.180.10

Supersedes EN 60793-1-40:2003

English Version

Optical fibres - Part 1-40: Attenuation measurement methods (IEC 60793-1-40:2019)

Fibres optiques - Partie 1-40: Méthodes de mesurage d'affaiblissement (IEC 60793-1-40:2019)

Lichtwellenleiter - Teil 1-40: Messmethoden und Prüfverfahren - Dämpfung (IEC 60793-1-40:2019)

This European Standard was approved by CENELEC on 2019-05-01. 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.

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 CENELEC 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 CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

(standards.iteh.ai)

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdonich avcatalog/standards/sist/ccet/22fe-d40c-442f-8f6a-

cde88d8e82ac/sist-en-iec-60793-1-40-2019



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

EN IEC 60793-1-40:2019 (E)

European foreword

The text of document 86A/1909/FDIS, future edition 2 of IEC 60793-1-40, 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 60793-1-40:2019.

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
- latest date by which the national standards conflicting with the document have to be withdrawn

This document supersedes EN 60793-1-40:2003.

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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

Endorsement notice

<u>SIST EN IEC 60793-1-40:2019</u> https://standards.iteh.ai/catalog/standards/sist/ccef22fe-d40c-442f-8f6a-

The text of the International Standard IEC 60793-1-40:2019 was approved by CENELEC as a European Standard without any modification.

EN IEC 60793-1-40:2019 (E)

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.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	EN/HD	<u>Year</u>
IEC 60793-1-1	-	Optical fibres - Part 1-1: Measurement methods and test procedures - General and guidance	EN 60793-1-1	-
IEC 60793-1-22	-	Optical fibres - Part 1-22: Measurement methods and test procedures - Length measurement	EN 60793-1-22	-
IEC 60793-1-43	- htt	Optical fibres - Part 1-43: Measurement methods and test procedures - Numerical aperture measurement avcatalog/standards/sist/ccef22fe-d40c-442f-8 cde88d8e82ac/sist-en-iec-60793-1-40-2019	EN 60793-1-43	-
IEC 61746-1	-	Calibration of optical time-domain reflectometers (OTDR) - Part 1: OTDR for single mode fibres	EN 61746-1	-
IEC 61746-2	-	Calibration of optical time-domain reflectometers (OTDR) - Part 2: OTDR for multimode fibres	EN 61746-2	-

SIST EN IEC 60793-1-40:2019

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN IEC 60793-1-40:2019
https://standards.iteh.ai/catalog/standards/sist/ccef22fe-d40c-442f-8f6a-cde88d8e82ac/sist-en-iec-60793-1-40-2019



IEC 60793-1-40

Edition 2.0 2019-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Optical fibres - iTeh STANDARD PREVIEW

Part 1-40: Attenuation measurement methods (Stanuar us. Iteh.ai)

Fibres optiques -

SIST EN IEC 60793-1-40:2019

Partie 1-40: Méthodes de mesurage de l'affaiblissement 42f-8f6a-

cde88d8e82ac/sist-en-iec-60793-1-40-2019

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 33.180.10 ISBN 978-2-8322-6593-2

Warning! Make sure that you obtained this publication from an authorized distributor.

Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

CONTENTS

FOREWORD5				
1 Scope		7		
2 Normative references .		7		
3 Terms and definitions .		8		
4 Calibration requiremen	Calibration requirements			
5 Reference test method		9		
6 Apparatus		9		
7 Sampling and specime	ns	9		
, •				
	e			
•				
9 Calculations		9		
9.1 Methods A and B		9		
9.2 Method C		9		
9.3 Method D		9		
_		-		
10.1 Information availa	ble with each measurement.R. R. V. I.R. V.	9		
10.2 Information availa	ble upon request1	0		
	ble upon request			
11 Specification information	n1	0		
Annex A (normative) Requi	SIST EN IEC 60793-1-40:2019 rements specific to method A – Cut-back dards.iteh.arcatalog/standards/sist/ccef22te-040c-442f-8f6a-	1		
A.1 General	cde88d8e82ac/sist-en-iec-60793-1-40-2019	1		
A.2 Apparatus	1	1		
A.2.1 General app	aratus for all fibres1	1		
A.2.2 Launch appa	ratus for all single-mode fibres1	3		
A.2.3 Launch appa	ratus for A1 multimode fibres1	4		
	ratus for A2 to A4 multimode fibres1			
	equirements1			
	1			
, , ,	rements specific to method B – Insertion loss1			
• • • • • • • • • • • • • • • • • • • •	1			
	ups			
• •	mmon to method A (cut-back)			
•	paratus specific to method B (insertion-loss)			
	equirements1			
	rements specific to method C – Backscattering2			
, , ,				
• • • • • • • • • • • • • • • • • • • •				
	mitter			
'	itions 2			

C.2.4 Optical splitter	22
C.2.5 Optical receiver	22
C.2.6 Pulse duration and repetition rate	22
C.2.7 Signal processor	22
C.2.8 Display	23
C.2.9 Data interface (optional)	23
C.2.10 Reflection controller (optional)	23
C.2.11 Splices and connectors	23
C.3 Sampling and specimens	23
C.4 Procedure	23
C.4.1 General	23
C.4.2 Further steps for measuring attenuation	25
C.4.3 Further steps for measuring point discontinuities	25
C.4.4 Calibration	27
C.5 Calculations	27
C.6 Results	27
Annex D (normative) Requirements specific to method D – Spectral attenuation	
modelling	
D.1 General	
D.2 Apparatus	
D.3 Sampling and specimens A.N.D.A.R.DP.R.E.V.I.E.W.	
D.4 Procedure (Standards.iteh.ai) D.5 Calculations (Standards.iteh.ai)	28
D.6 Results	29
D.6 Results	31
Bibliographyde88d8e82ac/sist-en-iec-60793-1-40-2019	33
Figure A.1 – Arrangement of equipment for loss measurement at a specified	4.4
wavelength	
Figure A.2 – Arrangement of equipment used to obtain loss spectrum	
Figure A.3 – General launch arrangement	12
Figure A.4 – Limited phase space launch optics	15
Figure A.5 – Two examples of optical fibre scramblers	16
Figure A.6 – Lens system	16
Figure A.7 – Launch fibre	17
Figure A.8 – Mode scrambler (for A.4 fibre)	17
Figure A.9 – A wide-spectrum source (line "b") could lead to attenuation measurement	
errors due to sharp variations on spectral attenuation of polymer-core fibres (line "a")	18
Figure B.1 – Calibration of insertion loss measurement set	20
Figure B.2 – Measurement of insertion loss	
Figure C.1 – Block diagram of an OTDR	
Figure C.2 – Schematic OTDR trace for a "uniform" specimen preceded by a dead-	2 1
zone fibre	24
Figure C.3 – Schematic OTDR trace for a "uniform" specimen not preceded by a dead-	·· - ·
zone fibre	24
Figure C.4 – Schematic OTDR trace showing apparent loss due to point discontinuities,	
one reflective and one non-reflective	26

_ 4 _	IEC 60702 4 40,2040	@ IEC 2010
- 4 -	IEC 60793-1-40:2019	© 1EC 2019

Figure C.5 – Schematic of an expanded OTDR trace showing two point discontinuities, one with apparent gain, and another with no apparent loss or gain	26
Figure E.1 – Example of attenuation coefficient tests on A1a.1 fibre	
Figure E.2 – Example of attenuation coefficient tests on A1a.3 fibre	31
Figure E.3 – Example of attenuation coefficient tests on A1b fibre	32
Table A.1 – Size examples	15
Table A 2 – Launch conditions for A2 to A4 fibres	

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN IEC 60793-1-40:2019 https://standards.iteh.ai/catalog/standards/sist/ccef22fe-d40c-442f-8f6a-cde88d8e82ac/sist-en-iec-60793-1-40-2019

INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRES -

Part 1-40: Attenuation measurement methods

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity. EC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

 SIST EN IEC 60793-1-40:2019
- 5) IEC itself does not provide any attestation of conformity independent certification bodies provide conformity assessment services and, in some areas access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60793-1-40 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2001. This edition constitutes a technical revision.

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

- a) Improvement of the description of measurement details for B6 fibre;
- b) Improvement of the calibration requirements for A4 fibre;
- Introduction of Annex E describing examples of short cable test results on A1 multimode fibres.

IEC 60793-1-40:2019 © IEC 2019

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

FDIS	Report on voting	
86A/1909/FDIS	86A/1927/RVD	

- 6 -

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.

iTeh STANDARD PREVIEW

IMPORTANT – The 'colour inside' logo on the cover page of this publication 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. https://standards.iteh.ai/catalog/standards/sist/ccef22fe-d40c-442f-8f6a-

cde88d8e82ac/sist on jec 60703 1 40 2010