STN	Optické káble. Časť 1-1: Kmeňová špecifikácia. Všeobecne.	STN EN 60794-1-1
		35 9223

Optical fibre cables - Part 1-1: Generic specification - General

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. 08/16

Obsahuje: EN 60794-1-1:2016, IEC 60794-1-1:2015

Oznámením tejto normy sa od 18.12.2018 ruší STN EN 60794-1-1 (35 9223) z mája 2012

# EUROPEAN STANDARD NORME EUROPÉENNE EUROPÄISCHE NORM

EN 60794-1-1

February 2016

ICS 33.180.10

Supersedes EN 60794-1-1:2011

#### **English Version**

# Optical fibre cables - Part 1-1: Generic specification - General (IEC 60794-1-1:2015)

Câbles à fibres optiques - Partie 1-1 : spécification générique - Généralités (IEC 60794-1-1:2015) Lichtwellenleiterkabel - Teil 1-1: Fachgrundspezifikation - Allgemeines (IEC 60794-1-1:2015)

This European Standard was approved by CENELEC on 2015-12-18. 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.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

### **European foreword**

The text of document 86A/1651/CDV, future edition 4 of IEC 60794-1-1, 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 60794-1-1:2016.

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)	2016-09-18
•	latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2018-12-18

This document supersedes EN 60794-1-1:2011.

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

### **Endorsement notice**

The text of the International Standard IEC 60794-1-1:2015 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 60793-2-10	NOTE	Harmonized as EN 60793-2-10.
IEC 60794-1-2	NOTE	Harmonized as EN 60794-1-2.
IEC 60794-1-23	NOTE	Harmonized as EN 60794-1-23.
IEC 60794-1-24	NOTE	Harmonized as EN 60794-1-24.
IEC 60794-4:2003	NOTE	Harmonized as EN 60794-4:2003.
IEC 60794-4-20:2012	NOTE	Harmonized as EN 60794-4-20:2012.
IEC 60794-4 (series)	NOTE	Harmonized as EN 60794-4:2003 (series).

# Annex ZA

(normative)

# Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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.

www.cenelec.eu.				
<u>Publication</u>	<u>Year</u>	<u>Title</u>	EN/HD	<u>Year</u>
IEC 60189-1	-	Low-frequency cables and wires with PVC	-	-
		insulation and PVC sheath - Part 1:		
		General test and measuring methods		
IEC 60304	-	Standard colours for insulation for low-	HD 402 S2	-
		frequency cables and wires		
IEC 60793-1-21	-	Optical fibres Part 1-21: Measurement	EN 60793-1-21	-
		methods and test procedures - Coating		
		geometry		
IEC 60793-1-40	-	Optical fibres Part 1-40: Measurement	EN 60793-1-40	-
		methods and test procedures - Attenuation		
IEC 60793-1-44	-	Optical fibres Part 1-44: Measurement	EN 60793-1-44	-
		methods and test procedures - Cut-off		
		wavelength		
IEC 60793-1-46	-	Optical fibres Part 1-46: Measurement	EN 60793-1-46	-
		methods and test procedures - Monitoring		
.=		of changes in optical transmittance		
IEC 60793-1-48	-	Optical fibres Part 1-48: Measurement	EN 60793-1-48	-
		methods and test procedures - Polarization		
IEO 00000 0		mode dispersion	=N 00=00 0	
IEC 60793-2	-	Optical fibres - Part 2: Product	EN 60793-2	-
IEO 00700 0 50		specifications - General	EN 00700 0 50	
IEC 60793-2-50	-	Optical fibres - Part 2-50: Product	EN 60793-2-50	-
		specifications - Sectional specification for		
IEO 00704 4 04		class B single-mode fibres	EN 00704 4 04	
IEC 60794-1-21	-	Optical fibre cables Part 1-21: Generic	EN 60794-1-21	-
		specification - Basic optical cable test		
IEC 60704 4 22		procedures - Mechanical tests methods	EN 60704 1 22	
IEC 60794-1-22	-	Optical fibre cables Part 1-22: Generic	EN 60794-1-22	-
		specification - Basic optical cable test		
IEC 60811-201		procedures - Environmental test methods	EN 60011 201	
IEC 00011-201	-	Electric and optical fibre cables - Test methods for non-metallic materials Part	EN 60811-201	-
		201: General tests - Measurement of		
		insulation thickness		
IEC 60811-202	_	Electric and optical fibre cables - Test	EN 60811-202	_
ILC 00011-202	_	methods for non-metallic materials Part	LN 00011-202	_
		202: General tests - Measurement of		
		thickness of non-metallic sheath		
IEC 60811-203	_	Electric and optical fibre cables - Test	EN 60811-203	_
120 00011-200		methods for non-metallic materials Part	LIV 00011-200	
		203: General tests - Measurement of		
		overall dimensions		
ISO 14001	_	Environmental management systems	_	_
		Requirements with guidance for use		
		qui o man galadillo loi doo		

### EN 60794-1-1:2016

ISO 14064-1 - Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals

IEC/TR 61931 - Fibre optic - Terminology -



# IEC 60794-1-1

Edition 4.0 2015-11

# INTERNATIONAL STANDARD



Optical fibre cables -

Part 1-1: Generic specification – General





# THIS PUBLICATION IS COPYRIGHT PROTECTED Copyright © 2015 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office Tel.: +41 22 919 02 11 3, rue de Varembé Fax: +41 22 919 03 00

CH-1211 Geneva 20 info@iec.ch Switzerland www.iec.ch

#### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

#### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

#### IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

### IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

#### Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - std.iec.ch/glossary

More than 60 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

#### IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.



# IEC 60794-1-1

Edition 4.0 2015-11

# INTERNATIONAL STANDARD



Optical fibre cables –
Part 1-1: Generic specification – General

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 33.180.10 ISBN 978-2-8322-3002-2

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

# CONTENTS

FC	DREWO	)RD	4
1	Scop	oe	6
2	Norn	native references	6
3	Term	ns and definitions	7
4	Grap	phical symbols and abbreviations	12
5	Opti	cal fibre cables	13
6	•	erials	
-	6.1	Optical fibre	
	6.1.1	•	
	6.1.2		
	6.1.3	Attenuation uniformity – Attenuation discontinuities	13
	6.1.4	Cable cut-off wavelength	14
	6.1.5	Fibre colouring	14
	6.1.6	Polarization mode dispersion (PMD)	14
	6.2	Electrical conductors	
	6.3	Other materials	
	6.4	Environmental requirements	
7	Cabl	e construction	
	7.1	General	
	7.2	Colour coding	
	7.2.1		
	7.2.2	5 11111 3	
8	7.2.3	Sheath colour codingsuring methods	
0		-	
	8.1 8.2	General  Measuring methods for dimensions	
	8.3	Measuring methods for mechanical characteristics	
	8.4	Measuring methods for electrical characteristics	
	8.5	Measuring methods for transmission and optical characteristics	
	8.6	Measuring methods for environmental characteristics	
	8.7	Measuring methods for cable element characterisation	
9	Rela	ted Technical Reports	
		(informative) Guidelines for specific defined applications and cabled fibre nce	18
	A.1	General	18
	A.2	Cabled fibre attenuation requirements	18
	A.3	Cabled fibre bandwidth requirements	
	A.4	Type testing at 1 625 nm	
Ar	nnex B	(informative) Guidelines for qualification sampling	
	B.1	General	
	B.2	Fibre selection for cable testing	
ь.	В.3	Pass/fail criteria	
ВI	bilogra	ohy	23
Ta	able 1 –	Measuring methods for dimensions	16

IEC 60794-1-1:2015 © IEC 2015	<b>- 3 -</b>

Table 2 – Measuring methods for electrical characteristics	16
Table 3 – Measuring methods for transmission and optical characteristics of cabled optical fibres	17
Table A.1 – Maximum cabled fibre attenuation coefficient (dB/km), as given by ITU-T	18
Table A.2 – Category A1 multimode fibre maximum cable attenuation coefficient (dB/km)	19
Table A.3 – Single-mode maximum cable attenuation coefficient (dB/km)	19
Table A.4 – Category A1 multimode cabled fibre bandwidth (MHz·km)	20
Table A.5 – Guidance values for 1 625 nm type test acceptance criteria	20

#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

### **OPTICAL FIBRE CABLES -**

### Part 1-1: Generic specification - General

#### **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, IEC 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.
- 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 60794-1-1 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This fourth edition cancels and replaces the third edition, published in 2011. This edition constitutes a technical revision.

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

- a) the expansion of the definitions, graphical symbols, terminology and abbreviations content, with the aim of making this standard the default and reference for all others in the IEC 60794-x series:
- b) the inclusion of updated and expanded optical fibre, attenuation and bandwidth sections, with the aim of making this standard the default and reference for all others in the IEC 60794-x series.

IEC 60794-1-1:2015 © IEC 2015

- 5 -

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

CDV	Report on voting
86A/1651/CDV	86A/1667/RVC

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

A list of all parts in the IEC 60794 series, published under the general title *Optical fibre cables*, can be found on the IEC website.

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

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

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

A bilingual version of this publication may be issued at a later date.

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.

- 6 - IEC 60794-1-1:2015 © IEC 2015

### **OPTICAL FIBRE CABLES -**

## Part 1-1: Generic specification - General

#### 1 Scope

This part of IEC 60794 applies to optical fibre cables for use with communication equipment and devices employing similar techniques and to cables having a combination of both optical fibres and electrical conductors.

The object of this standard is to establish uniform generic requirements for the geometrical, transmission, material, mechanical, ageing (environmental exposure), climatic and electrical properties of optical fibre cables and cable elements, where appropriate.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60189-1, Low-frequency cables and wires with PVC insulation and PVC sheath – Part 1: General test and measuring methods

IEC 60304, Standard colours for insulation for low-frequency cables and wires

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

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

IEC 60793-1-44, Optical fibres – Part 1-44: Measurement methods and test procedures – Cutoff wavelength

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

IEC 60793-1-48, Optical fibres – Part 1-48: Measurement methods and test procedures – Polarization mode dispersion

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

IEC 60793-2-50, Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres

IEC 60794-1-21, Optical fibre cables – Part 1-21: Generic specification – Basic optical cable test procedures – Mechanical tests methods

IEC 60794-1-22, Optical fibre cables – Part 1-22: Generic specification – Basic optical cable test procedures – Environmental tests methods

IEC 60794-1-1:2015 © IEC 2015

**-7-**

IEC 60811-201, Electric and optical fibre cables – Test methods for non-metallic materials – Part 201: General tests – Measurement of insulation thickness

IEC 60811-202, Electric and optical fibre cables – Test methods for non-metallic materials – Part 202: General tests – Measurement of thickness of non-metallic sheath

IEC 60811-203, Electric and optical fibre cables – Test methods for non-metallic materials – Part 203: General tests – Measurement of overall dimensions

IEC TR 61931, Fibre optic – Terminology

ISO 14001, Environmental management systems - Requirements with guidance for use

ISO 14064-1, Greenhouse gases – Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals

koniec náhľadu – text ďalej pokračuje v platenej verzii STN