

© Copyright SEK Svensk Elstandard. Reproduction in any form without permission is prohibited.

REDLINE VERSION

Optokablar – Del 2-20: Inomhuskablar – Familjespecifikation för flerfiberkablar vid användning som fördelningskablar

Optical fibre cables –

Part 2-20: Indoor cables –

Family specification for multi-fibre optical cables

En så kallad ”Redline version” (RLV) innehåller både standarden som fastställts som SEK-publication och en ändringsmarkerad IEC-standard. Alla tillägg och borttagningar sedan den tidigare utgåvan av IEC-standardens är markerade med färg. Med en RLV sparar du mycket tid när du ska identifiera och bedöma aktuella ändringar i standarden. SEK Svensk Elstandard kan bara ge ut RLV i de fall den finns tillgänglig från IEC.



IEC 60794-2-20

Edition 4.0 2024-12
REDLINE VERSION

INTERNATIONAL STANDARD



**Optical fibre cables –
Part 2-20: Indoor cables – Family specification for multi-fibre optical cables**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.180.01

ISBN 978-2-8327-0104-1

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

CONTENTS

FOREWORD	4
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
4 Construction	7
4.1 General.....	7
4.2 Optical fibres	8
4.3 Buffer.....	8
4.4 Ruggedized fibre.....	8
4.5 Slotted core	8
4.6 Tube	9
4.7 Stranded tube	9
4.8 Ribbon structure	9
4.9 Strength and anti-buckling members	9
4.10 Ripcord.....	9
4.11 Sheath	9
4.12 Sheath marking.....	9
4.13 Identification	9
4.14 Examples of cable constructions	10
5 Tests	10
5.1 General.....	10
5.2 Dimensions	10
5.3 Mechanical requirements	10
5.3.1 Cable Tensile performance	10
5.3.2 Cable Crush	11
5.3.3 Cable Impact	11
5.3.4 Cable Bending	11
5.3.5 Cable Repeated bending	12
5.3.6 Cable Bending under tension	12
5.3.7 Cable Bending at low temperature	12
5.3.8 Cable Flexing	12
5.3.9 Cable Torsion	12
5.3.10 Cable Kink.....	13
5.4 Environmental requirements – Temperature cycling	13
5.5 Transmission requirements	14
5.5.1 General	14
5.5.2 Single-mode optical fibres	14
5.5.3 Single-mode dispersion unshifted (B-652.B) optical fibre	14
5.5.4 Single-mode dispersion unshifted (B-652.D) optical fibre	15
5.5.5 Single-mode (B-657.A) optical fibre	15
5.5.6 Single-mode (B-657.B) optical fibre	15
5.5.7 Multimode optical fibres	15
5.5.8 Multimode (A1-OM1 to A1-OM5) optical fibres	16
5.6 Fire performance	16
Annex A (informative) Examples of cable constructions	17
Annex B (informative) Family specification for multi-fibre optical cables – Blank detail specification and minimum requirements.....	22

B.1	Blank detail specification	22
B.1.1	General	22
B.1.2	Cable description	22
B.1.3	Cable element	23
B.1.4	Cable construction	24
B.1.5	Installation and operating conditions	25
B.1.6	Mechanical and environmental tests	25
B.2	Cables subject to the MICE environmental classification (ISO/IEC 11801-1 and related standards)	26
	Bibliography	27
	Figure A.1 – Example of cross-section of a 12-fibre cable	17
	Figure A.2 – Example of cross-section of a 36-fibre cable	17
	Figure A.3 – Example of cross-section of a 6-fibre break-out cable	18
	Figure A.4 – Example of cross-section of a 24-fibre break-out cable	18
	Figure A.5 – Example of cross-section of a slotted core type indoor cable with 4-fibre ribbons	19
	Figure A.6 – Example of cross-section of an SZ (reverse oscillating lay) slotted core type indoor cable with 2-fibre ribbons	19
	Figure A.7 – Example of cross-section of an SZ (reverse oscillating lay) slotted core type indoor cable with 4-fibre bundles	20
	Figure A.8 – Example of multi-fibre unitube cable	20
	Figure A.9 – Example of multi-fibre cable	20
	Figure A.10 – Example of a retractable (micro-module) cable	21
	Table 1 – Dimensions of buffered fibres	8
	Table 2 – Sample temperature cycling values	13
	Table 2 – Typical values for temperature cycling	13
	Table 3 – Common single-mode optical fibre requirements	14
	Table 4 – Cabled fibre attenuation requirements for B-652.B optical fibre	14
	Table 5 – Cabled fibre attenuation requirements for B-652.D optical fibre	15
	Table 6 – Cabled fibre attenuation requirements for B-657.A optical fibre	15
	Table 7 – Cabled fibre attenuation requirements for B-657.B optical fibre	15
	Table 8 – Common multimode optical fibre requirements	15
	Table 9 – Cabled fibre attenuation requirements for A1-OM1 to A1-OM5 optical fibres	16
	Table B.1 – Cable description	22
	Table B.2 – Cable element	23
	Table B.3 – Cable construction	24
	Table B.4 – Installation and operating conditions	25
	Table B.5 – Tests applicable	25

INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRE CABLES –

**Part 2-20: Indoor cables –
Family specification for multi-fibre optical cables**

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60794-2-20:2013. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 60794-2-20 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 2013. This edition constitutes a technical revision.

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

- a) update of the normative references;
- b) review update of parameters and requirements for mechanical tests and environmental tests, maintaining alignment with additional relevant standards in the IEC 60794-2 series;
- c) addition of cabled fibre attenuation requirements;
- d) addition of cable design examples.

This document is to be used in conjunction with IEC 60794-1-1:2023, IEC 60794-1-2:2021, IEC 60794-1-21:2015 and IEC 60794-1-21:2015/AMD:2020, IEC 60794-1-22:2017, IEC 60794-1-23:2019 and IEC 60794-2:2017.

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

Draft	Report on voting
86A/2431/FDIS	86A/2520/RVD

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 IEC 60794 series, published under the general title *Optical fibre cables*, 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 FIBRE CABLES –

Part 2-20: Indoor cables – Family specification for multi-fibre optical cables

1 Scope

This part of IEC 60794 is a family specification covering multi-fibre optical cables for indoor use. The requirements of the sectional specification IEC 60794-2 are applicable to cables covered by this document. Annex B contains a blank detail specification and general guidance in case the cables are intended to be used in installations governed by the MICE table of ~~ISO/IEC 24702 (Industrial premises) [11]~~⁴ ISO/IEC 11801-1.

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.

~~NOTE—These reference complete the normative references already listed in the generic specification (IEC 60794-1-1 and IEC 60794-1-2):~~

~~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 60793-1-20, *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 60793-1-40, *Optical fibres – Part 1-40: Attenuation measurement methods*

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

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

IEC 60793-2-10, *Optical fibres – Part 2-10: Product specifications – Sectional specification for category A1 multimode fibres*

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

IEC 60794-1-1:2023, *Optical fibre cables – Part 1-1: Generic specification – General*

⁴—~~Figures in square brackets refer to the Bibliography.~~

IEC 60794-1-2:2021, *Optical fibre cables – Part 1-2: Generic specification – Basic optical cable test procedures – General guidance*

~~IEC 60794-1-20, *Optical fibre cables – Part 1-20: Generic specification – Basic optical cable test procedures – General and definitions*²~~

IEC 60794-1-21:2015, *Optical fibre cables – Part 1-21: Generic specification – Basic optical cable test procedures – Mechanical test methods*
IEC 60794-1-21:2015/AMD1:2020

IEC 60794-1-22:2017, *Optical fibre cables – Part 1-22: Generic specification – Basic optical cable test procedures – Environmental test methods*

IEC 60794-1-23:2019, *Optical fibre cables – Part 1-23: Generic specification – Basic optical cable test procedures – Cable element test methods*

IEC 60794-1-31, *Optical fibre cables – Part 1-31: Generic specification – Optical cable elements – Optical fibre ribbon*

IEC 60794-2:2002/2017, *Optical fibre cables – Part 2: Indoor cables – Sectional specification*

~~IEC 60794-3:2001, *Optical fibre cables – Part 3: Sectional specification – Outdoor cables*~~

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 60811-504, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 504: Mechanical tests – Bending tests at low temperature for insulation and sheaths*~~

~~IEC/TR 62222, *Fire performance of communication cables installed in buildings*~~

² ~~To be published.~~

© Copyright SEK Svensk Elstandard. Reproduction in any form without permission is prohibited.

Optokablar – Del 2-20: Inomhuskablar – Familjespecifikation för flerfiberkablar vid användning som fördelningskablar

*Optical fibre cables –
Part 2-20: Indoor cables –
Family specification for multi-fibre optical cables*

Som svensk standard gäller europastandarden EN IEC 60794-2-20:2025. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 60794-2-20:2025.

Nationellt förord

Europastandarden EN IEC 60794-2-20:2025

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60794-2-20, Fourth edition, 2024 - Optical fibre cables – Part 2-20: Indoor cables – Family specification for multi-fibre optical cables**

utarbetad inom International Electrotechnical Commission, IEC.

Standarden ska användas tillsammans med SS-EN IEC 60794-1-1, utg 5:2024, SS-EN IEC 60794-1-2, utg 5:2021, SS-EN 60794-1-21, utg 1:2015, SS-EN 60794-1-21, utg 1:2015/A1:2020, SS-EN IEC 60794-1-22, utg 2:2018, SS-EN IEC 60794-1-23, utg 2:2020 och SS-EN 60794-2, utg 2:2018.

Tidigare fastställd svensk standard SS-EN 60794-2-20, utg 3:2014 med eventuella tillägg, ändringar och rättelser gäller ej fr o m 2028-01-31.

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1042
172 21 Sundbyberg
Tel 08-444 14 00
elstandard.se

English Version

**Optical fibre cables - Part 2-20: Indoor cables - Family
specification for multi-fibre optical cables
(IEC 60794-2-20:2024)**

Câbles à fibres optiques - Partie 2-20 : Câbles intérieurs -
Spécification de famille pour les câbles optiques multifibres
(IEC 60794-2-20:2024)

Lichtwellenleiterkabel - Teil 2-20: LWL-Innenkabel -
Familienspezifikation für Mehrfaser-Lichtwellenleiterkabel
(IEC 60794-2-20:2024)

This European Standard was approved by CENELEC on 2025-01-15. 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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



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

European foreword

The text of document 86A/2431/FDIS, future edition 4 of IEC 60794-2-20, 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 60794-2-20:2025.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2026-01-31 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2028-01-31 document have to be withdrawn

This document supersedes EN 60794-2-20:2014 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.

This document is read in conjunction with EN IEC 60794-1-1:2023, EN IEC 60794-1-2:2021, EN 60794-1-21:2015¹, EN IEC 60794-1-22:2018, EN IEC 60794-1-23:2019, and EN 60794-2:2017.

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 60794-2-20:2024 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 60654 series	NOTE	Approved as EN 60654 series
IEC 60721-1	NOTE	Approved as EN 60721-1
IEC 60721-3-3	NOTE	Approved as EN IEC 60721-3-3
IEC 60794-1-3	NOTE	Approved as EN 60794-1-3
IEC 60794-1-21	NOTE	Approved as EN 60794-1-21
IEC 61000-6-2	NOTE	Approved as EN IEC 61000-6-2
IEC 61753-1	NOTE	Approved as EN IEC 61753-1
IEC 61918	NOTE	Approved as EN IEC 61918
IEC 60794-2 series	NOTE	Approved as EN IEC 60794-2 series

¹ As impacted by EN 60794-1-21:2015/A1:2020.

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>	<u>EN/HD</u>	<u>Year</u>
IEC 60304	-	Standard colours for insulation for low-frequency cables and wires	HD 402 S2	-
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 60793-1-40	-	Optical fibres - Part 1-40: Attenuation measurement methods	EN IEC 60793-1-40	-
IEC 60793-1-44	-	Optical fibres - Part 1-44: Measurement methods and test procedures - Cut-off wavelength	EN IEC 60793-1-44	-
IEC 60793-1-46	-	Optical fibres - Part 1-46: Measurement methods and test procedures - Monitoring of changes in attenuation	EN IEC 60793-1-46	-
IEC 60793-2-10	-	Optical fibres - Part 2-10: Product specifications - Sectional specification for category A1 multimode fibres	EN IEC 60793-2-10	-
IEC 60793-2-50	-	Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single-mode fibres	EN IEC 60793-2-50	-
IEC 60794-1-1	2023	Optical fibre cables - Part 1-1: Generic specification - General	EN IEC 60794-1-1	2023
IEC 60794-1-2	2021	Optical fibre cables - Part 1-2: Generic specification - Basic optical cable test procedures - General guidance	EN IEC 60794-1-2	2021
IEC 60794-1-21	2015	Optical fibre cables - Part 1-21: Generic specification - Basic optical cable test procedures - Mechanical tests methods	EN 60794-1-21	2015
+ A1	2020		+ A1	2020

EN IEC 60794-2-20:2025 (E)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60794-1-22	2017	Optical fibre cables - Part 1-22: Generic specification - Basic optical cable test procedures - Environmental test methods	EN IEC 60794-1-22	2018
IEC 60794-1-23	2019	Optical fibre cables - Part 1-23: Generic specification - Basic optical cable test procedures - Cable element test methods	EN IEC 60794-1-23	2019
IEC 60794-1-31	-	Optical fibre cables - Part 1-31: Generic specification - Optical cable elements - Optical fibre ribbon	EN IEC 60794-1-31	-
IEC 60794-2	2017	Optical fibre cables - Part 2: Indoor cables - Sectional specification	EN 60794-2	2017
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	EN 60811-202	-
IEC 60811-203	-	Electric and optical fibre cables - Test methods for non-metallic materials - Part 203: General tests - Measurement of overall dimensions	EN 60811-203	-

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Optical fibre cables –
Part 2-20: Indoor cables – Family specification for multi-fibre optical cables**

**Câbles à fibres optiques –
Partie 2-20: Câbles intérieurs – Spécification de famille pour les câbles optiques
multifibres**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 33.180.01

ISBN 978-2-8327-0082-2

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

FOREWORD	4
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
4 Construction	7
4.1 General.....	7
4.2 Optical fibres	7
4.3 Buffer.....	8
4.4 Ruggedized fibre.....	8
4.5 Slotted core	8
4.6 Tube	8
4.7 Stranded tube	8
4.8 Ribbon structure	8
4.9 Strength and anti-buckling members	9
4.10 Ripcord.....	9
4.11 Sheath	9
4.12 Sheath marking.....	9
4.13 Identification	9
4.14 Examples of cable constructions	9
5 Tests	9
5.1 General.....	9
5.2 Dimensions	10
5.3 Mechanical requirements	10
5.3.1 Tensile performance	10
5.3.2 Crush	10
5.3.3 Impact	10
5.3.4 Bending	11
5.3.5 Repeated bending	11
5.3.6 Bending under tension.....	11
5.3.7 Bending at low temperature	11
5.3.8 Flexing	11
5.3.9 Torsion	12
5.3.10 Cable kink	12
5.4 Environmental requirements – Temperature cycling	12
5.5 Transmission requirements	13
5.5.1 General	13
5.5.2 Single-mode optical fibres	13
5.5.3 Single-mode dispersion unshifted (B-652.B) optical fibre	13
5.5.4 Single-mode dispersion unshifted (B-652.D) optical fibre	13
5.5.5 Single-mode (B-657.A) optical fibre	14
5.5.6 Single-mode (B-657.B) optical fibre	14
5.5.7 Multimode optical fibres	14
5.5.8 Multimode (A1-OM1 to A1-OM5) optical fibres	15
5.6 Fire performance	15
Annex A (informative) Examples of cable constructions	16
Annex B (informative) Family specification for multi-fibre optical cables – Blank detail specification and minimum requirements.....	21

B.1	Blank detail specification	21
B.1.1	General	21
B.1.2	Cable description.....	21
B.1.3	Cable element	22
B.1.4	Cable construction	23
B.1.5	Installation and operating conditions.....	24
B.1.6	Mechanical and environmental tests	24
B.2	Cables subject to the MICE environmental classification (ISO/IEC 11801-1 and related standards)	25
	Bibliography.....	26
Figure A.1	– Example of cross-section of a 12-fibre cable	16
Figure A.2	– Example of cross-section of a 36-fibre cable	16
Figure A.3	– Example of cross-section of a 6-fibre break-out cable	17
Figure A.4	– Example of cross-section of a 24-fibre break-out cable	17
Figure A.5	– Example of cross-section of a slotted core type indoor cable with 4-fibre ribbons	18
Figure A.6	– Example of cross-section of an SZ (reverse oscillating lay) slotted core type indoor cable with 2-fibre ribbons.....	18
Figure A.7	– Example of cross-section of an SZ (reverse oscillating lay) slotted core type indoor cable with 4-fibre bundles	19
Figure A.8	– Example of multi-fibre unitube cable	19
Figure A.9	– Example of multi-fibre cable.....	19
Figure A.10	– Example of a retractable (micro-module) cable	20
Table 1	– Dimensions of buffered fibres	8
Table 2	– Typical values for temperature cycling.....	12
Table 3	– Common single-mode optical fibre requirements	13
Table 4	– Cabled fibre attenuation requirements for B-652.B optical fibre	13
Table 5	– Cabled fibre attenuation requirements for B-652.D optical fibre	14
Table 6	– Cabled fibre attenuation requirements for B-657.A optical fibre	14
Table 7	– Cabled fibre attenuation requirements for B-657.B optical fibre	14
Table 8	– Common multimode optical fibre requirements	14
Table 9	– Cabled fibre attenuation requirements for A1-OM1 to A1-OM5 optical fibres.....	15
Table B.1	– Cable description	21
Table B.2	– Cable element.....	22
Table B.3	– Cable construction	23
Table B.4	– Installation and operating conditions	24
Table B.5	– Tests applicable	24

INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRE CABLES –**Part 2-20: Indoor cables –
Family specification for multi-fibre optical cables**

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60794-2-20 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 2013. This edition constitutes a technical revision.

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

- a) update of the normative references;
- b) review update of parameters and requirements for mechanical tests and environmental tests, maintaining alignment with additional relevant standards in the IEC 60794-2 series;
- c) addition of cabled fibre attenuation requirements;

d) addition of cable design examples.

This document is to be used in conjunction with IEC 60794-1-1:2023, IEC 60794-1-2:2021, IEC 60794-1-21:2015 and IEC 60794-1-21:2015/AMD:2020, IEC 60794-1-22:2017, IEC 60794-1-23:2019 and IEC 60794-2:2017.

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

Draft	Report on voting
86A/2431/FDIS	86A/2520/RVD

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 IEC 60794 series, published under the general title *Optical fibre cables*, 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 FIBRE CABLES –

Part 2-20: Indoor cables – Family specification for multi-fibre optical cables

1 Scope

This part of IEC 60794 is a family specification covering multi-fibre optical cables for indoor use. The requirements of the sectional specification IEC 60794-2 are applicable to cables covered by this document. Annex B contains a blank detail specification and general guidance in case the cables are intended to be used in installations governed by the MICE table of ISO/IEC 11801-1.

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

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 60793-1-40, *Optical fibres – Part 1-40: Attenuation measurement methods*

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

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

IEC 60793-2-10, *Optical fibres – Part 2-10: Product specifications – Sectional specification for category A1 multimode fibres*

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

IEC 60794-1-1:2023, *Optical fibre cables – Part 1-1: Generic specification – General*

IEC 60794-1-2:2021, *Optical fibre cables – Part 1-2: Generic specification – Basic optical cable test procedures – General guidance*

IEC 60794-1-21:2015, *Optical fibre cables – Part 1-21: Generic specification – Basic optical cable test procedures – Mechanical test methods*
IEC 60794-1-21:2015/AMD1:2020

IEC 60794-1-22:2017, *Optical fibre cables – Part 1-22: Generic specification – Basic optical cable test procedures – Environmental test methods*

IEC 60794-1-23:2019, *Optical fibre cables – Part 1-23: Generic specification – Basic optical cable test procedures – Cable element test methods*

IEC 60794-1-31, *Optical fibre cables – Part 1-31: Generic specification – Optical cable elements – Optical fibre ribbon*

IEC 60794-2:2017, *Optical fibre cables – Part 2: Indoor cables – Sectional specification*

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*