

INTERNATIONAL STANDARD



**Optical fibre cables –
Part 2-31: Indoor cables – Detailed specification for optical fibre ribbon cables
for use in premises cabling**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2019 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
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
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 corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

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 It also gives information on projects, replaced and withdrawn publications.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 once a month by email.

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: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 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.

INTERNATIONAL STANDARD



**Optical fibre cables –
Part 2-31: Indoor cables – Detailed specification for optical fibre ribbon cables
for use in premises cabling**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.180.10

ISBN 978-2-8322-6841-4

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

CONTENTS

FOREWORD	3
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 General requirements	6
5 Particular requirements	7
5.1 Fibre selection for cable testing	7
5.2 Environmental requirements –Temperature cycling	7
5.3 Transmission requirements	7
5.3.1 Attenuation of cabled fibre	7
5.3.2 Fibre bandwidth requirements	8
Bibliography	9
Table 1 – Multimode cable maximum attenuation coefficient (dB/km)	7
Table 2 – Single-mode cable maximum attenuation coefficient (dB/km)	8
Table 3 – Minimum multimode fibre bandwidth (MHz·km)	8

INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRE CABLES –

**Part 2-31: Indoor cables –
Detailed specification for optical fibre ribbon cables
for use in premises cabling**

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.

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

International Standard IEC 60794-2-31 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This third edition cancels and replaces the second edition published in 2012. It constitutes a technical revision.

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

- a) incorporation of the OM5 cabled fibre performance category;
- b) incorporation of the OS1a cabled fibre performance category;
- c) cabled fibre performance categories OM1, OM2 and OS1 are no longer normative, and are retained for information.

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

FDIS	Report on voting
86A/1923/FDIS	86A/1933/RVD

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 the parts in the 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 "<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.

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 publication using a colour printer.

OPTICAL FIBRE CABLES –

Part 2-31: Indoor cables – Detailed specification for optical fibre ribbon cables for use in premises cabling

1 Scope

This part of IEC 60794 presents the detailed requirements specific to ~~indoor optical fibre ribbon cables~~ this type of cable to ensure compatibility with the series of International Standards ISO/IEC 11801, *Information technology – Generic cabling for customer premises* (Parts 1 to 6).

The requirements of family specification IEC 60794-2-30 are applicable to cables covered by this document.

The particular requirements detailed in Clause 4 define either a specific option in relation to the requirements of IEC 60794-2-30 or additional requirements.

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—They complete the normative references already listed in the generic specification (IEC 60794-1-1[1]¹ and IEC 60794-1-2) and in the sectional specification (IEC 60794-2-2) or in the family specification (IEC 60794-2-30).~~

IEC 60793-2-10:2011 —, *Optical fibres – Part 2-10: Product specifications – Sectional specification for category A1 multimode fibres*²

IEC 60793-2-50:2008 2018, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

IEC 60794-1-1:2015, *Optical fibre cables – Part 1-1: Generic specification – General*

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

IEC 60794-2-10:2011, *Optical fibre cables – Part 2-10: Indoor optical fibre cables – Family specification for simplex and duplex cables*

IEC 60794-2-30:2008, *Optical fibre cables – Part 2-30: Indoor cables – Family specification for ribbon cables*

~~ISO/IEC 11801, *Information technology – Generic cabling for customers premises*~~

¹—Numbers in square brackets refer to the Bibliography

² Edition 7 under preparation. Stage at the time of publication: IEC DECFDIS 60793-2-10:2019

3 Terms and 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 General requirements

The cable shall comply with the family specification IEC 60794-2-30 and meet the requirements that are defined in it.

The optical fibre contained in the cables which are covered by this document shall comply with one of the following International Standards and meet the ~~normative~~ requirements defined within them as applicable:

- ~~IEC 60793-2-50:2008, Annex A (Single-mode B1.1 fibre)~~
- ~~IEC 60793-2-50:2008, Annex C (Single-mode B1.3 fibre)~~
- ~~IEC 60793-2-50:2008, Annex G (Single-mode B6_a1 and B6_a2 fibre)~~
- ~~IEC 60793-2-10:2011, Annex A (Multimode A1a.1, 50 µm core fibre)~~
- ~~IEC 60793-2-10:2011, Annex A (Multimode A1a.2, 50 µm core fibre)~~
- ~~IEC 60793-2-10:2011, Annex A (Multimode A1a.3, 50 µm core fibre)~~
- ~~IEC 60793-2-10:2011, Annex B (Multimode A1b, 62,5 µm core fibre)~~
- IEC 60793-2-50:2018, Annex A (single-mode B-652.D fibre);
- IEC 60793-2-50:2018, Annex F (single-mode B-657 fibres);
- IEC 60793-2-10:—3, Annex A (multimode A1-OM3 fibre);
- IEC 60793-2-10:—, Annex A (multimode A1-OM4 fibre);
- IEC 60793-2-10:—, Annex A (multimode A1-OM5 fibre).

To ensure compatibility with ISO/IEC 11801 (all parts), optical performance level requirements are presented in terms of the performance classification codes for cabled optical fibre as follows:

- ~~OS1 Single-mode fibre, categories B1.1, B1.3 or sub-categories B6_a1 and B6_a2;~~
- ~~OS2 Single-mode fibre, category B1.3 or sub-categories B6_a1 and B6_a2~~
- ~~OM1 Multimode fibre, model A1a.1 or sub-category; A1b~~
- ~~OM2 Multimode fibre, model A1a.1 or sub-category; A1b;~~
- ~~OM3 Multimode fibre, model A1a.2;~~
- ~~OM4 Multimode fibre, model A1a.3.~~
- OS1a Single-mode fibre, categories B-652.D or B-657;
- OS2 Single-mode fibre, categories B-652.D or B-657;
- OM3 Multimode fibre, A1-OM3 category;
- OM4 Multimode fibre, A1-OM4a.3 category;

³ Edition 7 under preparation. Stage at the time of publication: IEC DECFDIS 60793-2-10:2019.

- OM5 Multimode fibre, A1-OM5 category.

NOTE These codes are informative from the perspective of the requirements defined in this document. The OS1, OM1 and OM2 performance classification codes for cabled optical fibre are no longer normative in ISO/IEC 11801 (all parts). See ISO/IEC 11801-1:2017, Annex F, for more information.

5 Particular requirements

5.1 Fibre selection for cable testing

The fibre selection for cable testing shall be performed according to IEC 60794-1-1:2015, Annex B.

5.2 Environmental requirements – Temperature cycling

~~The cable shall meet the requirement of IEC 60794-2-30:2008, Table 2, Option c (–20 °C to +60 °C).~~

The cable shall be tested as per IEC 60794-2-10:2011, 5.4.1, and shall meet one of the following temperature ranges as per the MICE classification system:

- C₁: –10 °C to +60 °C;
- C₂: –25 °C to +70 °C;
- C₃: –40 °C to +70 °C.

The test shall be performed on a 50 m specimen.

No attenuation changes (in accordance with IEC 60794-1-1) shall be allowed during the test (~~see IEC 60794-1-2 for definition of “no change in attenuation”~~).

5.3 Transmission requirements

5.3.1 Attenuation of cabled fibre

Depending on the fibre category, the attenuation coefficient of the cabled fibre shall be less than the maximum values in Table 1 for the multimode fibres and less than the maximum values in Table 2 for single-mode fibres – for the wavelengths listed in Table 2.

The fibre category and performance level shall be agreed between customer and supplier.

Table 1 – Multimode cable maximum attenuation coefficient (dB/km)

Fibre	Attenuation coefficient at 850 nm	Attenuation coefficient at 1 300 nm	Performance codes
IEC 60793-2-10, A1a.1	3,5	1,5	OM1-OM2
IEC 60793-2-10, A1a.2	3,5	1,5	OM1-OM2-OM3
IEC 60793-2-10, A1a.3	3,5	1,5	OM1-OM2-OM3-OM4
IEC 60793-2-10, A1b	3,5	1,5	OM1-OM2
IEC 60793-2-10, A1-OM3	3,0	1,5	OM3
IEC 60793-2-10, A1-OM4	3,0	1,5	OM4
IEC 60793-2-10, A1-OM5	3,0	1,5	OM5