IEC 60794-2-50

Edition 3.0 2023-03
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Optical fibre cables –
Part 2-50: Indoor cables – Family specification for simplex and duplex cables for use in terminated cable assemblies



IEC 60794-2-50:2023-03 RLV(en)



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2023 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 Secretariat
3, rue de Varembé
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 It also gives information on projects, replaced and withdrawn publications.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.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC 60794-2-50

Edition 3.0 2023-03
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Optical fibre cables –
Part 2-50: Indoor cables – Family specification for simplex and duplex cables for use in terminated cable assemblies

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.180.10

ISBN 978-2-8322-6746-2

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

® Registered trademark of the International Electrotechnical Commission

CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 7
3 Terms and definitions 8
4 Construction 8
4.1 General 8
4.2 Optical fibres and primary coating 8
4.3 Buffer 8
4.4 Tube 9
4.5 Strength and anti-buckling members 9
4.6 Sheath 9
4.7 Sheath marking 9
4.8 Examples of cable constructions 9
5 Tests 10
5.1 General 10
5.2 Dimensions 10
5.3 Mechanical requirements 11
5.3.1 Tensile performance 11
5.3.2 Crush 11
5.3.3 Impact 12
5.3.4 Repeated bending 12
5.3.5 Bend 12
5.3.6 Torsion 13
5.3.7 Bend at low temperature 13
5.3.8 Kink 14
5.3.9 Sheath pull-off force 14
5.3.10 Abrasion resistance of cable marking 14
5.3.11 Buffered fibre movement under compression 14
5.4 Environmental requirements 15
5.4.1 Temperature cycling 15
5.4.2 Sheath shrinkage ~~(informative)~~ 16
6 Transmission requirements 17
7 Fire performance 17
Annex A (informative) Examples of ~~types of~~ cable constructions 18
Annex B (informative) Guidance on the selection of tests applicable to optical fibre cables for use in ~~patchcords~~ terminated cable assemblies 24
Bibliography 27

~~Figure A.1 – Simplex loose non-buffered fibre cable ..... .~~
~~Figure A.2 – Simplex fibre cable ..... .~~
~~Figure A.3 – Duplex loose non-buffered fibre cable ..... .~~
~~Figure A.4 – Duplex fibre cable ..... .~~
~~Figure A.5 – Duplex fibre zip cord ..... .~~
~~Figure A.6 – Duplex flat cable ..... .~~

~~Figure A.7 – Duplex round cable (breakout cable)~~
Figure A.1 – Simplex non-buffered cable 21
Figure A.2 – Simplex cable 21
Figure A.3 – Duplex non-buffered cable 21
Figure A.4 – Duplex cable 22
Figure A.5 – Duplex zip cord cable 22
Figure A.6 – Duplex flat cable 23
Figure A.7 – Duplex round cable (breakout cable) 23

Table 1 – Outer dimensions of buffered fibres 9
~~Table 2 – Temperature cycling ranges according to the application environment~~
Table 2 – Preferred low and high temperatures 16
Table B.1 – Cable test method summary 24
Table B.2 – Blank detail specification for cable testing agreement 26

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

OPTICAL FIBRE CABLES –

Part 2-50: Indoor cables – Family specification for simplex and duplex cables for use in terminated cable assemblies

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 IEC 60794-2-50:2020. 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 60794-2-50 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics. It is an International Standard.

This third edition cancels and replaces the second edition published in 2020. This edition constitutes a technical revision.

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

a) added IEC 60793-1-46 and IEC 60794-1-211 to the normative references;
b) changed the load duration for the tensile test from 5 min to 10 min;
c) clarified the distance between the clamps for torsion test to 125 times cable diameter, but not less than 0,3 m;
d) recommended the temperatures –10 °C and +60 °C for indoor simplex and duplex cables and included the low and high temperatures for category C, C^{HD}, OP and OP^{HD} according to the operating service environments in IEC 61753-1 for temperature cycling and shrinkage testing;
e) updated the shrinkage test standard to IEC 60794-1-211, F11A, and changed the requirement to maximum 20 mm;
f) replaced the text for the fire performance with an improved description.

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

Draft	Report on voting
86A/2284/FDIS	86A/2316/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 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 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 document using a colour printer.

INTRODUCTION

This document includes test methods according to IEC 60794-1-21, IEC 60794-1-22 and IEC 60794-1-23 that will be split into single documents and individually renumbered in the IEC 60794-1-1xx series, IEC 60794-1-2xx series and IEC 60794-1-3xx series. Full cross-reference details are given in IEC 60794-1-2.

OPTICAL FIBRE CABLES –

Part 2-50: Indoor cables – Family specification for simplex and duplex cables for use in terminated cable assemblies

1 Scope

This part of IEC 60794 is a family specification that specifies requirements for simplex and duplex optical fibre cables for use in terminated cable assemblies or as used for termination ~~with optical fibre~~ of passive components.

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

IEC 60793-1-32, *Optical fibres – Part 1-32: Measurement methods and test procedures – Coating strippability*

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

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, *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 – General guidance*

IEC 60794-1-211, *Optical fibre cables – Part 1-211: Generic specification – Basic optical cable test procedures – Environmental test methods – Sheath shrinkage, method F11*

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

IEC 60794-2, *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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60794-1-1 and the following apply.

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

3.1
terminated cable assembly
~~short length of cable provisioned with a connector at both ends~~

cable terminated with connectors

Note 1 to entry: Examples from the ISO/IEC 11801 series are optical fibre ~~optic~~ cords used to establish connections on patch panels, equipment and at work areas or to connect outlets to the terminal equipment.

Note 2 to entry: A so called patch cord or jumper is one type of a terminated cable assembly.

4 Construction

4.1 General

In addition to the constructional requirements in IEC 60794-2, the following considerations apply to simplex and duplex indoor cables for use in terminated cable assemblies.

It is not the intention of this document to specify the finished terminated cable assembly complete with terminations.

There shall be no fibre splice in a delivery length. It shall be possible to identify each individual fibre throughout the length of the cable.

4.2 Optical fibres and primary coating

Multimode or single-mode optical fibres meeting the requirements of IEC 60793-2-10 sub-categories A1-OM1 ~~and~~ or A1-OM2 to A1-OM5 or IEC 60793-2-50 class B shall be used.

4.3 Buffer

If a tight or semi-tight (loosely applied) buffer is required, it shall consist of one or more layers of inert material. Unless otherwise specified, the tight buffer shall be ~~removable~~ removed in one operation together with fibre coating over the specified length. Semi-tight tubes may be filled. For semi-tight and loose buffer, the buffer material is ~~stripped off~~ removed for a specified length leaving the primary coating of the fibre intact.