

INTERNATIONAL STANDARD



Optical fibre cables –
Part 2-10: Indoor optical fibre cables – Family specification for simplex and
duplex cables

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 60794-2-10:2023](https://standards.iteh.ai/catalog/standards/iec/c3a4e7f0-85c8-4635-8344-02d1de2b4c6e/iec-60794-2-10-2023)

<https://standards.iteh.ai/catalog/standards/iec/c3a4e7f0-85c8-4635-8344-02d1de2b4c6e/iec-60794-2-10-2023>





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 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 It also gives information on projects, replaced and withdrawn publications.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.

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.

International Standards
Document Preview

[IEC 60794-2-10:2023](https://standards.iteh.ai/catalog/standards/iec/c3a4e7f0-85c8-4635-8344-02d1de2b4c6e/iec-60794-2-10-2023)

<https://standards.iteh.ai/catalog/standards/iec/c3a4e7f0-85c8-4635-8344-02d1de2b4c6e/iec-60794-2-10-2023>



IEC 60794-2-10

Edition 3.0 2023-03
REDLINE VERSION

INTERNATIONAL STANDARD



Optical fibre cables –
Part 2-10: Indoor optical fibre cables – Family specification for simplex and
duplex cables

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[IEC 60794-2-10:2023](https://standards.itih.ai/catalog/standards/iec/c3a4e7f0-85c8-4635-8344-02d1de2b4c6e/iec-60794-2-10-2023)

<https://standards.itih.ai/catalog/standards/iec/c3a4e7f0-85c8-4635-8344-02d1de2b4c6e/iec-60794-2-10-2023>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.180.10

ISBN 978-2-8322-6646-5

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 and primary coating.....	7
4.3 Buffer.....	8
4.4 Ruggedised fibre.....	8
4.5 Slotted core	8
4.6 Tube	8
4.7 Stranded loose tube.....	8
4.8 Ribbon structure	8
4.9 Strength and anti-buckling members	8
4.10 Ripcord.....	9
4.11 Sheath.....	9
4.12 Sheath marking.....	9
4.13 Identification	9
4.14 Examples of typical cable constructions designs	9
5 Dimensions – Optical fibres and primary coating	9
6 Tests	9
6.1 General.....	9
6.2 Dimensions	10
6.3 Mechanical requirements	10
6.3.1 General	10
6.3.2 Tensile performance	10
6.3.3 Crush	10
6.3.4 Impact	11
6.3.5 Bend.....	11
6.3.6 Repeated bending	11
6.3.7 Bending under tension.....	11
6.3.8 Bending at low temperature	11
6.3.9 Flexing	11
6.3.10 Torsion	11
6.3.11 Kink.....	11
6.4 Environmental requirements – Temperature cycling	12
6.5 Transmission requirements	13
6.5.1 General	13
6.5.2 Single-mode optical fibres	13
6.5.3 Single-mode dispersion unshifted (B1.1B-652.B) optical fibre	13
6.5.4 Single-mode dispersion unshifted (B1.3B-652.D) optical fibre	13
6.5.5 Single-mode (B6_aB-657.A) optical fibre	14
6.5.6 Single-mode (B6_bB-657.B) optical fibre	14
6.5.7 Multimode optical fibres	14
6.5.8 Multimode (A1a and A1bA1-OM1 to A1-OM5) optical fibres	14
6.6 Fire performance	15

Annex A (informative) Examples of some types typical of cable construction designs	16
Annex B (informative) Family specification of indoor cables – Simplex and duplex cables	20
B.1 Blank detail specification	20
B.1.1 Cable description	20
B.1.2 Cable elements	21
B.1.3 Cable construction	21
B.1.4 Installation and operating conditions	22
B.1.5 Mechanical, environmental and fire performance tests	22
B.2 Additional requirements for cables subject to the MICE environmental classification (ISO/IEC 24702 ISO/IEC 11801-1 and related standards)	23
Bibliography	24
Figure A.1 – Simplex loose non-buffered fibre cable	16
Figure A.2 – Simplex ruggedised fibre cable	16
Figure A.3 – Duplex loose non-buffered fibre cable	17
Figure A.4 – Duplex ruggedised fibre cable	17
Figure A.5 – Duplex ruggedised fibre zip cord	17
Figure A.6 – Duplex flat cable	18
Figure A.7 – Duplex round cable	18
Figure A.8 – Simplex and duplex rectangular cables	19
Table 1 – Dimensions of buffered fibres	8
Table 2 – Temperature cycling conditions	8
Table 2 – Method: IEC 60794-1-22, F1	12
Table 3 – Common single-mode optical fibre requirements	13
Table 4 – Cabled fibre attenuation requirements for B1.1 B-652.B optical fibre	13
Table 5 – Cabled fibre attenuation requirements for B1.3 B-652.D optical fibre	13
Table 6 – Cabled fibre attenuation requirements for B6_a B-657.A optical fibre	14
Table 7 – Cabled fibre attenuation requirements for B6_b B-657.B optical fibre	14
Table 8 – Common multimode optical fibre requirements	14
Table 9 – Cabled fibre attenuation requirements for A1a and A1b A1-OM1 to A1-OM5 optical fibres	14
Table B.1 – Cable description	20
Table B.2 – Cable elements	21
Table B.3 – Cable construction	21
Table B.4 – Installation and operating conditions	22
Table B.5 – Tests applicable	22

INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRE CABLES –

Part 2-10: Indoor optical fibre cables – Family specification for simplex and duplex 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) 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 60794-2-10:2011. 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 60794-2-10 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 2011. This edition constitutes a technical revision.

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

- a) updating of normative references;
- b) updating of all relevant A1 and B1 fibre category and sub-category designations.

This International Standard is to be used in conjunction with IEC 60794-1-1:2022, IEC 60794-1-2:2021, IEC 60794-1-21:2015 and IEC 60794-1-21:2015/AMD1:2020, 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/2277/FDIS	86A/2311/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,
- replaced by a revised edition, or
- amended.

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 2-10: Indoor optical fibre cables – Family specification for simplex and duplex cables

1 Scope

This part of IEC 60794 is a family specification that covers simplex and duplex optical fibre cables for indoor use ~~except for cables used in terminated assemblies specified by IEC 60794-2-50~~. The requirements of IEC 60794-2 are applicable to cables covered by this document.

For cables intended for installation in industrial applications specified in ~~ISO/IEC 24702~~ ISO/IEC 11801-1, MICE specifications ~~may~~ can be additionally required (see Clause B.2).

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 1—They complete the normative references already listed in the generic specification (IEC 60794-1-1, Clause 2, and IEC 60794-1-2, Clause 2).~~

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 ~~and test procedures~~ – Attenuation*

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

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

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:~~2008~~2022, *Optical fibre cables – Part 1-1: Generic specification – General*

IEC 60794-1-2:~~2007~~, *Optical fibre cables – Part 1-2: Generic specification – Basic optical cable test procedures – General guidance*

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 test methods*

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

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

~~IEC 60811-1-1, *Common test methods for insulating and sheathing materials of electric cables – Part 1-1: Methods for general application – Measurement of thickness and overall dimensions – Tests for determining the mechanical properties*~~

~~NOTE 2—IEC 60811-1-1 is under revision to be replaced by IEC 60811-201, IEC 60811-202 and IEC 60811-203.~~

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

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

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>

<https://www.iso.org/obp/ui/#iso:code:2b4c6e/iec-60794-2-10-2023>

4 Construction

4.1 General

In addition to the constructional requirements in IEC 60794-2, the following apply to simplex and duplex indoor cables.

The cable shall be designed and manufactured for an expected operating lifetime of at least 15 years. In this context, the attenuation of the installed cable at the operational wavelength(s) shall not exceed the values agreed between the customer and the supplier. The materials in the cable shall not present a health or environmental hazard within its intended use.

There shall be no fibre splice in a delivery length unless otherwise agreed between the customer and the supplier.

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 shall be used which meet the requirements of IEC 60793-2.

4.3 Buffer

If a buffer is required, it shall consist of one or more layers of inert material. The buffer shall be easily removable. For tight buffers, the buffer and fibre primary coating shall be removable in one operation over a minimum length of ~~10 mm to 25 mm~~ 15 mm, depending on customer requirements. For semi-tight buffers, the buffer shall be easily removable over a minimum length of ~~0,3 m to 0,5 m~~ 300 mm. For loose buffers, the buffer shall be easily removable over a length of not less than 1,0 m.

Buffer dimensions are shown in Table 1.

Table 1 – Dimensions of buffered fibres

Buffer type	Nominal diameter mm	Tolerances mm
Semi-tight or loose buffer	0,3 to 1,3	± 0,05
Tight buffer	0,3 to 1,0	± 0,05

4.4 Ruggedised fibre

Further protection can be provided to buffered fibres by surrounding one or two of the fibres with non-metallic strength members within a sheath of suitable polymeric material.

4.5 Slotted core

Cables of this construction are not commonly used.

4.6 Tube

One or two primary coated or buffered fibres are packaged (loosely or not) in a tube construction which may be filled. The tube may be reinforced with a composite wall.

The polymeric tube may be hard, in order to provide crush protection to the fibre bundle, or soft to enable easy strippability of the tube without the use of specialized tools.

If required the suitability of the tube shall be determined by an evaluation of its kink resistance in accordance with ~~IEC 60794-1-2~~ IEC 60794-1-23, Method G7.

4.7 Stranded loose tube

Cables of this construction are not commonly used, however two general designs can be employed:

- a) loose tubes laid in parallel;
- b) a number of homogeneous loose tubes stranded helically or with the reverse-oscillating (SZ) method

4.8 Ribbon structure

Cables of this construction are not commonly used.

4.9 Strength and anti-buckling members

The cable shall be designed with sufficient strength members to meet installation and service conditions so that the fibres are not subjected to strain in excess of limits agreed between the customer and the supplier.

The strength ~~and/or~~, anti-buckling member or both may be either metallic or non-metallic and may be located in the cable core ~~and/or~~ under the sheath ~~and/~~, or in the sheath.

4.10 Ripcord

Ripcords are not commonly used.

4.11 Sheath

The cable shall have an overall protective sheath. The cable ~~diameter~~ dimension(s) shall be specified in the relevant ~~detail~~ specification ~~(or product specification)~~.

4.12 Sheath marking

~~If required, the cable shall be marked according to the local regulations or the agreement between the customer and the supplier.~~

Local regulations for sheath marking can apply. In the absence of local regulations, there can be an agreement between the customer and supplier.

4.13 Identification

In case of duplex cables, the cable design should enable clear polarity identification for each individual fibre. When fibre colouring is used for identification, standard colours shall be used as closely as possible (reasonable match) to IEC 60304.

4.14 Examples of typical cable ~~constructions~~ designs

Examples of ~~some main types of~~ typical cable ~~construction~~ designs are shown in Annex A. Other configurations are not excluded if they meet the mechanical, environmental and transmission requirements given in this document.

5 Dimensions – Optical fibres and primary coating

The dimensions of the individual primary coated fibres in the finished product shall be in accordance with one of the sectional specifications defined in IEC 60793-2 series. The fibre dimensions (e.g. cladding diameter or outer diameter including colouring) shall be verified in accordance with IEC 60793-1-20 for fibre geometry or IEC 60793-1-21 for coating geometry. Cable and cable element dimensions shall be measured in accordance with IEC 60794-1-1. For dimensions of buffers see Table 2.

6 Tests

6.1 General

Compliance with the specification requirements shall be verified by carrying out tests selected from the 6.2 to 6.5. It is not intended that all tests shall be carried out; the frequency of testing shall be agreed between the customer and supplier.

Unless otherwise specified, all tests shall be carried out at ~~ambient temperature~~ standard atmospheric conditions in accordance with IEC 60794-1-2.

These tests are not intended to define end-of-life performance.

See Annex B for a blank detail specification.

6.2 Dimensions

The fibre dimensions and tolerances shall be checked in accordance with the test method as specified in IEC 60793-1-20 for fibre geometry or IEC 60793-1-21 for coating geometry. The diameter of the buffer and of the cable, as well as the thickness of the sheath, shall be measured in accordance with the methods of ~~IEC 60811-1-1~~ IEC 60811-201 for insulation thickness and IEC 60811-203 for overall dimensions.

6.3 Mechanical requirements

6.3.1 General

Some of the following tests can be performed on a short sample length of cable which is still an integral part of a longer length. Thus it becomes possible to detect permanent changes in attenuation. The maximum value of this attenuation change shall be agreed between the customer and supplier.

6.3.2 Tensile performance

Method:	IEC 60794-1-21, E1
Diameter of chuck drums and transfer devices:	not less than 250 mm
Rate of transfer device:	either 100 mm/min or 100 N/min
Load:	$T_M = 75$ N applied for 10 min for simplex cables and normal duplex cables $T_M = 150$ N applied for 10 min for duplex cables which consist of independent simplex cables (see NOTE 1)

NOTE 1 In case of duplex cables that include two simplex cables and bearing the applied tensile force by the strength members of each simplex cable, as shown in Figure A.5 Figure A.6 (without the optional strength member) and Figure A.7, the tensile requirement for the duplex cable ~~shall~~ will be double that for the simplex cable. The rationale is that those simplex cables ~~may~~ can be taken out from the duplex cable and will be independently used.

NOTE 2 The requirements of tensile load depend on the construction of cables. Lower values ~~may~~ can be adopted for some types of cables, for example small factor simplex cables.

Length of sample:	sufficient to achieve the desired accuracy of measurement of attenuation change and shall be agreed between customer and supplier no less than 50 m unless specified in the relevant specification. For cables requiring specialized anchoring devices, the minimum length shall be 25 m.
Requirements:	no change in attenuation after the test and there shall be no damage to the cable elements Fibre strain shall not exceed a value agreed upon between customer and supplier for 1 % proof-tested fibres, the fibre strain under short-term tensile load (T_M) the fibre strain shall not exceed 60 % of the fibre proof strain and the attenuation change during test shall be measured and recorded. Other criteria may be agreed between the customer and the supplier. Under visual examination without magnification, there shall be no damage to the sheath or to the cable elements.

6.3.3 Crush

Method:	IEC 60794-1-2, E3 IEC 60794-1-21, E3A
Force (short term):	500 N
Duration:	1 min

Length between test locations: 500 mm
 Requirements: no change in attenuation after the test and there shall be no damage to the cable elements

NOTE In the case of flat cables the force is applied on the flat sides of the cable.

6.3.4 Impact

Method: ~~IEC 60794-1-2, E4~~ IEC 60794-1-21, E4
~~Radius of striking surface: 12,5 mm~~
 Impact energy: 1,0 J
 Number of impacts: at least 3, each separated by at least 500 mm
 Requirements: no fibre breakage

NOTE In the case of flat cables the force is applied on the flat sides of the cable.

6.3.5 Bend

Method: ~~IEC 60794-1-2, E11A~~ IEC 60794-1-21, E11A
 Mandrel diameter: 60 mm
 Number of turns: 6
 Number of cycles: 10
 Requirements: no fibre breakage

NOTE In the case of flat cables the force is applied on the flat sides of the cable.

6.3.6 Repeated bending

None.

6.3.7 Bending under tension

None.

<https://standards.iteh.ai/catalog/standards/iec/c3a4e7f0-85c8-4635-8344-02d1de2b4c6e/iec-60794-2-10-2023>

<https://standards.iteh.ai/catalog/standards/iec/c3a4e7f0-85c8-4635-8344-02d1de2b4c6e/iec-60794-2-10-2023>

6.3.8 Bending at low temperature

None.

6.3.9 Flexing

None.

6.3.10 Torsion

Method: ~~IEC 60794-1-2, E7~~ IEC 60794-1-21, E7
 Number of cycles: ~~3~~ 10
 Distance between fixed and rotating clamp: 125 x cable diameter but no less than 0,3 m and not more than 1 m
 Tension load: 20 N
 Requirements: no fibre breakage

6.3.11 Kink

Method: ~~IEC 60794-1-2, E10~~ IEC 60794-1-21, E10
 Minimum loop diameter: 20 times cable diameter
 Requirement: no kink shall occur

6.4 Environmental requirements – Temperature cycling

5.4.1 Temperature cycling

See Table 2.

Method: IEC 60794-1-2, F1

Table 2 – Temperature cycling conditions

	Low temperature T_A	High temperature T_B
a)	0 °C	+50 °C
b)	-5 °C	+50 °C
c)	-20 °C	+60 °C
d)	-45 °C	+60 °C

NOTE – Condition a), b), c) or d) will be selected depending on application and customer requirements, for example condition c) is appropriate for applications to ISO/IEC 11801.

For indoor simplex and duplex cables, -10 °C and +60 °C are the recommended low and high temperatures. Based on different environment classifications, other operating temperatures can be agreed upon between customer and supplier. Table 2 gives the operating temperature limits based on environmental classification.

Table 2 – Method: IEC 60794-1-22, F1

Low temperature T_{A2} °C	High temperature T_{B2} °C	Sources of temperature limits	
		Performance categories of connectors, components and protective housings ^a	Environmental classification of customer premises cabling ^b
-10	+60	C (recommended)	$M_x I_x C_1 E_x$
-25	+70	OP	$M_x I_x C_2 E_x$
-40	+70	I	$M_x I_x C_3 E_x$

A suitable operating service environment (performance category) or environmental classification should be selected in accordance with the application. A complete list of operating service environments can be found in IEC 60794-1-1.

^a Included in IEC 61753-1. The abbreviated terms stand for:
C: indoor controlled environment;
OP: outdoor protected environment;
I: industrial environment;

^b Included in ISO/IEC 11801-1. For an introduction to the MICE environmental classification system use ISO/IEC TR 29106. The abbreviation MICE stands for: mechanical, ingress, climatic, electromagnetic.

- Period t_1 : sufficient so that the cable has reached, and stabilised to, the specified temperature
- Number of cycles: 2
- Length of sample: sufficient to achieve the desired accuracy of measurement of attenuation
- Requirement: maximum increase in attenuation to be agreed between customer and supplier