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INTERNATIONAL STANDARD

Optical fibres –
Part 2-60: Product specifications – Sectional specification for category C single-mode intraconnection fibres

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FOREWORD

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International Standard IEC 60793-2-60 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

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

CDV	Report on voting
86A/1160A/CDV	86A/1201/RVC

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

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

A list of all parts of the IEC 60793 series can be found, under the general title *Optical Fibres*, on the IEC website.

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

- reconfirmed;
- withdrawn;
- replaced by a revised edition; or
- amended.

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

OPTICAL FIBRES –

Part 2-60: Product specifications – Sectional specification for category C single-mode intraconnection fibres

1 Scope

This part of IEC 60793 is applicable to optical fibre types C1, C2, C3, C4, as described in Table 1. These fibres are used for the intraconnections within or between components or photonic systems or subsystems. While the fibres are sold in lengths on the scale of kilometres, they are normally cut into short lengths for use in these intraconnections. While the fibres could be overcoated or buffered for the purpose of making protected pigtails, they may be used without overcoating. They may, however, be colour-coded.

The general requirements defined in IEC 60793-2 apply to these fibres. Specific requirements that are common to these fibres are found in the body of this text. Particular requirements for individual fibre types or applications are defined in Annexes A, B, C and D, which refer to normative family specifications. These family specifications are distinguished based on optimum transmission wavelengths and nominal Mode Field Diameter (MFD), which affects splice loss.

For each family specification, there are two sub-categories that are distinguished on the basis of the cladding diameter and other related attributes. The conventional nominal cladding diameter of 125 μm is augmented with the reduced cladding type product with a nominal diameter of 80 μm. These are distinguished with the suffixes: "_125" or "_80". For example C1 fibre can be selected as either C1_125 or C1_80. The transmission characteristics of the two cladding diameter choices should be the same.

For each family specification except C1, there are two sub-categories that are distinguished on the basis of transmission characteristics that relate to MFD. To denote these sub-categories, a "_a" or "_b" suffix is added, for lower or higher MFD. In general, the fibres can be optimised for either splice loss or macro-bend loss using MFD as a main variable. A C2 fibre with 80 μm cladding diameter and lower MFD is designated as C2_80_a.

Fibres for the C1_125 family specification can be selected fom category B1.1 or B1.3 single-mode fibres and are suitable for use with any category B single-mode fibre at wavelengths from 1 280 nm to 1 625 nm. Fibres for the C2 and C3 family specifications are optimized at nominal wavelengths of 1 310 nm and 1 550 nm respectively for connection to any category B single-mode fibre. Fibres for the C4 family specification are optimized for transporting optical amplifier pump light at 980 nm or higher.

Table 1 – List of families and main differences

Families	Nominal transmission wavelengths nm	Nominal MFDs
C1	1 260, 1 550 and 1 625	8,6 – 9,5 μm at 1 310 nm
C2	1 310	5,0 – 7,0 μm at 1 310 nm
C3	1 550 and 1 625	5,5 – 7,5 μm at 1 550 nm
C4	980	4,0 – 7,0 μm at 980 nm

2 Normative references

The following referenced documents are indispensable for the application 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 60793-1-22, *Optical fibres – Part 1-22: Measurement methods and test procedures – Length measurement*

IEC 60793-1-30, *Optical fibres – Part 1-30: Measurement methods and test procedures – Fibre proof test*

IEC 60793-1-31, *Optical fibres – Part 1-31: Measurement methods and test procedures – Tensile strength*

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

IEC 60793-1-33, *Optical fibres – Part 1-33: Measurement methods and test procedures – Stress corrosion susceptibility*

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

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

IEC 60793-1-45, *Optical fibres – Part 1-45: Measurement methods and test procedures – Mode field diameter*

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

IEC 60793-1-47, *Optical fibres – Part 1-47: Measurement methods and test procedures – Macrobending loss*

IEC 60793-1-50, *Optical fibres – Part 1-50: Measurement methods and test procedures – Damp heat (steady state)*

IEC 60793-1-51, *Optical fibres – Part 1-51: Measurement methods and test procedures – Dry heat*

IEC 60793-1-52, *Optical fibres – Part 1-52: Measurement methods and test procedures – Change of temperature*

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

IEC/TR 61931, *Fibre optic – Terminology*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions related to testing given in IEC 61931, as well as the terms and definitions related to fibres given in IEC 60793-2, apply. Moreover, the definitions of the specified attributes are contained in the test methods.

3.2 Symbols and abbreviations

The following symbols and abbreviations are used in this document:

F_{avg} average strip force

F_{peak} peak strip force

MFD Mode Field Diameter

n_d stress corrosion parameter – dynamic

4 Specifications

The fibre shall consist of a glass core, glass cladding, and coating in accordance with 5.1 of IEC 60793-2.

4.1 Dimensional requirements

Dimensional attributes and measurement methods that may be specified are given in Table 2. Minimum requirements, common to all fibres in this category, are given in Table 3. Some family specification requirements may be more strict.

Table 2 – Dimensional attributes and measurement methods

Attributes	Tests
Cladding diameter	IEC 60793-1-20
Cladding non-circularity	IEC 60793-1-20
Core concentricity error	IEC 60793-1-20
Coating diameter	IEC 60793-1-21
Coating non-circularity	IEC 60793-1-21
Cladding-coating concentricity error	IEC 60793-1-21
Fibre length	IEC 60793-1-22

Table 3 – Requirements common to class C fibres

Attributes	Units	_125 Limits	_80 Limits
Cladding diameter[a]	µm	125 ± 1,0	80 ± 1,0
Cladding non-circularity	%	≤ 1,0	≤ 1,0
Core concentricity error	µm	≤ 0,5	≤ 0,5
Coating diameter – uncoloured [a]	µm	235 to 255	155 to 175
Fibre length	km	[b]	[b]

[a] Tolerance applies to the entire length of fibre.

[b] Length requirements vary and should be agreed between customer and supplier.

4.2 Mechanical requirements

Mechanical attributes and measurement methods that may be specified are given in Table 4. Minimum mechanical requirements, common to all fibres in class C, are given in Table 5. Some family specification values may be more strict.

Table 4 – Mechanical attributes and measurement methods

Attributes	Tests
Proof test	IEC 60793-1-30
Tensile strength	IEC 60793-1-31
Coating strippability	IEC 60793-1-32
Stress corrosion susceptibility	IEC 60793-1-33

Table 5 – Mechanical requirements common to class C fibres

Attributes	Units	Limits
Proof stress level	GPa	≥ 0,69
Coating strip force		The coating shall be mechanically strippable. Heat stripping may be most appropriate for some coatings
Tensile strength (median) for 0,5 m specimen length	GPa	≥ 3,8

4.3 Transmission requirements

Transmission attributes and measurement methods that may be specified are given in Table 6. Some family specifications may have additional attributes or test methods. Minimum requirements, common to all class C fibres, are given in Table 7. Some family specifications may be more stringent. Requirements that shall be specified in the family specifications are listed in Table 8.

Table 6 – Transmission attributes and measurement methods

Attributes	Tests
Attenuation coefficient	IEC 60793-1-40 [a]
Fibre cut-off wavelength	IEC 60793-1-44
Mode field diameter	IEC 60793-1-45
Macro-bending loss	IEC 60793-1-47
[a] The attenuation coefficient at various wavelengths can be calculated using the measured values at a few wavelengths using a spectral model such as the one given in IEC 60793-1-40. For example, the attenuation at 1 480 nm can be calculated and used for design of systems that employ remote pumping of optical amplifiers.	

Table 7 – Transmission requirements common to class C fibres

Attributes	Units	Limits
This table is empty, but retained in case of some common minimum requirement		

Table 8 – Transmission attributes required in family specifications

Attributes required in family specifications
Maximum attenuation coefficient and wavelength
Nominal mode field diameter, tolerance, and wavelength
Macro-bending loss increase, wavelength, bend radius, and number of turns
Fibre cut-off wavelength
NOTE Fibre cut-off wavelength is the default, but alternative configurations may be agreed for some applications such as fibre being used on a bobbin. In these cases, the measured cut-off wavelength values can be generally mapped to the bend/length conditions for the alternative applications.

4.4 Environmental requirements

Environmental attributes tests and measurement methods are documented in two forms:

– various environmental exposure tests are given in Table 9;

– mechanical or transmission attributes that may change when subjected to environmental exposure are listed in Table 10.

Table 9 – Environmental attributes and test methods

Environmental exposures	Tests
Damp heat tests	IEC 60793-1-50
Dry heat tests	IEC 60793-1-51
Change of temperature tests	IEC 60793-1-52

Table 10 – Environment dependant mechanical or transmission attributes and test methods

Attributes	Test methods
Change in optical transmission	IEC 60793-1-46
Attenuation	IEC 60793-1-40
Coating strip force	IEC 60793-1-32
Tensile strength	IEC 60793-1-31
Stress corrosion sensitivity	IEC 60793-1-33

These tests are normally conducted periodically as type-tests for a fibre and coating design. Unless otherwise specified, the recovery period allowed between completing the environmental exposure and performing the attribute measurements shall be as stated in the particular environmental conditioning test standard.

4.4.1 Transmission requirements

Change in attenuation from the initial value shall be less than the values specified in the relevant family specification.

4.4.2 Mechanical requirements

These tests are, in practice, the most severe requirements amongst the environment exposures defined in Table 9.

4.4.2.1 Coating strip force

In addition to the un-aged strip force requirements in 4.2, coating strip force after damp heat ageing shall be specified in the family specifications. The ageing options are also specified.

4.4.2.2 Tensile strength

The attributes given in Table 11 shall be verified following removal of the fibre from the environment.

Table 11 – Tensile strength requirements common to class C fibres

Environment	Median tensile strength (GPa), specimen length: 0,5 m	15 % of the tensile strength distribution (GPa), specimen length: 0,5 m
Damp heat	≥ 3,03	≥ 2,76
NOTE These requirements do not apply to hermetically coated fibre or to fibre that is intended for sole use within hermetically sealed enclosure.		

4.4.2.3 Stress corrosion susceptibility

The attributes given in Table 12 shall be verified following removal of the fibre from the environment.

Table 12 – Stress corrosion susceptibility requirements common to class C fibres

Environment	Stress corrosion Susceptibility constant, n_d
Damp heat	≥ 18
NOTE This requirement does not apply to hermetically coated fibre or to fibre that is intended for sole use within hermetically sealed enclosures.	

Annex A
(normative)

Family specification for C1 single-mode fibre

A.1 Introduction

The C1 single-mode fibre is a single-mode intraconnection fibre that is suitable for use with any category B single-mode fibre at wavelengths from 1 280 nm to 1 625 nm. It is optimised for precision glass geometry and improved macro-bending, and generally having lower fibre cut-off wavelength compared to that of B1.1 fibres.

The following clauses and tables contain the requirements for C1 fibres. Common requirements, copied for ease of reference from the sectional specification, are noted by an entry in the "Ref." column. Relevant notes from the sectional specification are not repeated, but indicated with a superscript[SS].

A.2 Dimensional requirements

Table A.1 contains dimensional requirements for C1 fibres.

Table A.1 – Dimensional requirements for C1 fibres

Attributes	Units	_125 Limits	_80 Limits	Ref.
Cladding diameter	µm	125,0 ± 0,7	80 ± 1,0	
Cladding non-circularity	%	≤ 0,7	≤ 1,0	
Core concentricity error	µm	≤ 0,5	≤ 0,5	
Coating diameter – uncoloured	µm	235 to 255	155 to 175	4.1
Fibre length	km	(See 4.1)	(See 4.1)	4.1

A.3 Mechanical requirements

Table A.2 contains mechanical requirements for C1 fibres.

Table A.2 – Mechanical requirements for C1 fibres

Attributes	Units	_125 Limits	_80 Limits	Ref.
Proof stress level	Gpa	≥ 0,69	≥ 0,69	4.2
Coating strip force (average)	N	$1,0 \leq F_{avg} \leq 5,0$	$1,0 \leq F_{avg} \leq 5,0$	
Coating strip force (peak)	N	$F_{peak} \leq 8,9$	$F_{peak} \leq 8,9$	
Tensile strength (median) for 0,5 m specimen length	GPa	≥ 3,8	≥ 3,8	4.2

A.4 Transmission requirements

Table A.3 contains transmission requirements for C1 fibres. These limits apply to both _125 and _80 fibres.

Table A.3 – Transmission requirements for C1 fibres

Attributes	Units	Limits	Ref.
Attenuation coefficient from 1 310 nm to 1 625 nm	dB/km	≤ 0,7	
Mode field diameter range of nominal values at 1 310 nm	µm	8,6 – 9,5	
Mode field diameter tolerance	µm	± 0,4	
Fibre cut-off wavelengths	nm	≤ 1 280	
Macro-bending loss at 1 625 nm, 5 turns on a 16 mm radius mandrel	dB	≤ 1,0	

A.5 Environmental requirements

The following clauses contain requirements specific to C1 fibres. These limits apply to all sub-categories.

A.5.1 Transmission requirements

Change in attenuation from the initial value shall be less than the values in Table A.4. Attenuation shall be measured periodically during the entire exposure to each environment and after removal.

Table A.4 – Environment dependant transmission requirements for C1 fibres

Environment	Wavelengths nm	Maximum attenuation increase dB/km
Damp heat	1 310	≤ 0,10
	1 550	≤ 0,10
Dry heat	1 310	≤ 0,10
	1 550	≤ 0,10
Change of temperature	1 310	≤ 0,10
	1 550	≤ 0,10

A.5.2 Mechanical requirements – Coating strip force

Table A.5 shows attributes that shall be verified following removal of the fibre from the environment.

Table A.5 – Environment dependant mechanical requirements for C1 fibres

Environment	Average strip force N	Peak strip force N
_125 Damp heat	$1{,}0 \leq F_{avg} \leq 5{,}0$	$F_{peak} \leq 8{,}9$
_80 Damp heat	$1{,}0 \leq F_{avg} \leq 5{,}0$	$F_{peak} \leq 8{,}9$

Annex B
(normative)

Family specification for C2 single-mode fibre

B.1 Introduction

The C2 single-mode fibre is a reduced bend loss single-mode intraconnection fibre that is optimized for loss performance in the 1 310 nm region.

The following clauses and tables contain the requirements for C2 fibres. Common requirements, copied for ease of reference from the sectional specification, are noted by an entry in the "Ref." column. Relevant notes from the sectional specification are not repeated. but indicated with a superscript[SS].

B.2 Dimensional requirements

Table B.1 contains dimensional requirements for C2 fibres. These limits apply to both "_a" and "_b" sub-categories.

Table B.1 – Dimensional requirements for C2 fibres

Attributes	Units	_125 Limits	_80 Limits	Ref.
Cladding diameter	μm	125,0 ± 1,0	80,0 ± 1,0	4.1
Cladding non-circularity	%	≤ 1,0	≤ 1,0	4.1
Core concentricity error	μm	≤ 0,5	≤ 0,5	4.1
Coating diameter – uncoloured	μm	235 to 255	155 to 175	4.1
Fibre length	km	(See 4.1)	(See 4.1)	4.1

B.3 Mechanical requirements

Table B.2 contains mechanical requirements for C2 fibres. These limits apply to both "_a" and "_b" sub-categories.

Table B.2 – Mechanical requirements for C2 fibres

Attributes	Units	_125 Limits	_80 Limits	Ref.
Proof stress level	GPa	≥ 0,69	≥ 0,69	4.2
Coating strip force (average)	N	$1,0 \leq F_{avg} \leq 5,0$	$1,0 \leq F_{avg} \leq 5,0$	
Coating strip force (peak)	N	$F_{peak} \leq 8,9$	$F_{peak} \leq 8,9$	
Tensile strength (median) for 0,5 m specimen length	GPa	≥ 3,8	≥ 3,8	4.2

B.4 Transmission requirements

Table B.3 contains transmission requirements for C2 fibres. The limits apply to both 80 μm and 125 μm nominal cladding diameter sub-categories.

Table B.3 – Transmission requirements for C2 fibres

Attributes	Units	_a Limits	_b Limits	Ref.
Attenuation coefficient at 1 310 nm	dB/km	≤ 0,75	≤ 0,75	
Mode field diameter range of nominal values at 1 310 nm	μm	5,0 – 6,0	6,1 – 7,0	
Mode field diameter tolerance	μm	± 0,75	± 0,75	
Fibre cut-off wavelength	nm	≤ 1 280	≤ 1 280	
Macro-bending loss at 1 550 nm, 5 turns on a 10 mm radius mandrel	dB	≤ 0,02	≤ 0,05	

B.5 Environmental requirements

The following clauses contain requirements specific to C2 fibre. These limits apply to all sub-categories.

B.5.1 Transmission requirements

Change in attenuation from the initial value shall be less than the values in Table B.4. Attenuation shall be measured periodically during the entire exposure to each environment and after removal.

Table B.4 – Environment dependant transmission requirements for C2 fibres

Environment	Wavelengths nm	Maximum attenuation increase dB/km
Damp heat	1 310	≤ 0,10
Dry heat	1 310	≤ 0,10
Change of temperature	1 310	≤ 0,10

B.5.2 Mechanical requirements – Coating strip force

Table B.5 shows attributes that shall be verified following removal of the fibre from the environment.

Table B.5 – Environment dependant mechanical requirements for C2 fibres

Environment	Average strip force N	Peak strip force N
_125 Damp heat	$1{,}0 \leq F_{avg} \leq 5{,}0$	$F_{peak} \leq 8{,}9$
_80 Damp heat	$1{,}0 \leq F_{avg} \leq 5{,}0$	$F_{peak} \leq 8{,}9$

Annex C
(normative)

Family specification for C3 single-mode fibre

C.1 Introduction

The C3 single-mode fibre is a reduced bend loss single-mode intraconnection fibre that is optimized for loss performance in the 1 550 nm region.

The following clauses and tables contain the requirements for C3 fibres. Common requirements, copied for ease of reference from the sectional specification, are noted by an entry in the "Ref." column. Relevant notes from the sectional specification are not repeated. but indicated with a superscript[SS].

C.2 Dimensional requirements

Table C.1 contains dimensional requirements for C3 fibres. These limits apply to both "_a" and "_b" sub-categories.

Table C.1 – Dimensional requirements for C3 fibres

Attributes	Units	_125 Limits	_80 Limits	Ref.
Cladding diameter	μm	125,0 ± 1,0	80,0 ± 1,0	4.1
Cladding non-circularity	%	≤ 1,0	≤ 1,0	4.1
Core concentricity error	μm	≤ 0,5	≤ 0,5	4.1
Coating diameter – uncoloured	μm	235 to 255	155 to 175	4.1
Fibre length	km	(See 4.1)	(See 4.1)	4.1

C.3 Mechanical requirements

Table C.2 contains mechanical requirements for C3 fibres. These limits apply to both "_a" and "_b" sub-categories.

Table C.2 – Mechanical requirements for C3 fibres

Attributes	Units	_125 Limits	_80 Limits	Ref.
Proof stress level	GPa	≥ 0,69	≥ 0,69	4.2
Coating strip force (average)	N	$1,0 \leq F_{avg} \leq 5,0$	$1,0 \leq F_{avg} \leq 5,0$	
Coating strip force (peak)	N	$F_{peak} \leq 8,9$	$F_{peak} \leq 8,9$	
Tensile strength (median) for 0,5 m specimen length	GPa	≥ 3,8	≥ 3,8	4.2

C.4 Transmission requirements

Table C.3 contains transmission requirements for C3 fibres. The limits apply to both 80 μm and 125 μm nominal cladding diameter sub-categories.

Table C.3 – Transmission requirements for C3 fibres

Attributes	Units	_a Limits	_b Limits	Ref.
Attenuation coefficient at 1 550 nm	dB/km	≤ 0,6	≤ 0,6	
Mode field diameter range of nominal values at 1 550 nm	μm	5,5– 6,5	6,6– 7,5	
Mode field diameter tolerance	μm	± 0,75	± 0,75	
Fibre cut-off wavelength	nm	≤ 1 500	≤ 1 500	
Macro-bending loss at 1 625 nm, 5 turns on a 10 mm radius mandrel	dB	≤ 0,02	≤ 0,05	

C.5 Environmental requirements

The following clauses contain requirements specific to C3 fibre. These limits apply to all sub-categories.

C.5.1 Transmission requirements

Change in attenuation from the initial value shall be less than the values in Table C.4. Attenuation shall be measured periodically during the entire exposure to each environment and after removal.

Table C.4 – Environment dependant transmission requirements for C3 fibres

Environment	Wavelengths nm	Maximum attenuation increase dB/km
Damp heat	1 550	≤ 0,10
Dry heat	1 550	≤ 0,10
Change of temperature	1 550	≤ 0,10

C.5.2 Mechanical requirements – Coating strip force

Table C.5 shows attributes that shall be verified following removal of the fibre from the environment.

Table C.5 – Environment dependant mechanical requirements for C3 fibres

Environment	Average strip force N	Peak strip force N
_125 Damp heat	$1,0 \leq F_{avg} \leq 5,0$	$F_{peak} \leq 8,9$
_80 Damp heat	$1,0 \leq F_{avg} \leq 5,0$	$F_{peak} \leq 8,9$

Annex D
(normative)

Family specification for C4 single-mode fibre

D.1 Introduction

The C4 single-mode fibre is a single-mode intraconnection fibre that is intended to support 980 nm transmissions. Applications include fibre for Erbium Doped Fibre Amplfiers (EDFAs), couplers, or other Dense Wavelength Division Multiplexing (DWDM) applications.

The following clauses and tables contain the requirements for C4 fibres. Common requirements, copied for ease of reference from the sectional specification, are noted by an entry in the "Ref." column. Relevant notes from the sectional specification are not repeated, but indicated with a superscript[SS].

D.2 Dimensional requirements

Table D.1 contains dimensional requirements for C4 fibres. These limits apply to both "_a" and "_b" sub-categories.

Table D.1 – Dimensional requirements for C4 fibres

Attributes	Units	_125 Limits	_80 Limits	Ref.
Cladding diameter	µm	125,0 ± 1,0	80,0 ± 1,0	4.1
Cladding non-circularity	%	≤ 1,0	≤ 1,0	4.1
Core concentricity error	µm	≤ 0,5	≤ 0,5	4.1
Coating diameter – uncoloured	µm	235 to 255	155 to 175	4.1
Fibre length	km	(See 4.1)	(See 4.1)	4.1

D.3 Mechanical requirements

Table D.2 contains mechanical requirements for C4 fibres. These limits apply to both "_a" and "_b" sub-categories.

Table D.2 – Mechanical requirements for C4 fibres

Attributes	Units	_125 Limits	_80 Limits	Ref.
Proof stress level	GPa	≥ 0,69	≥ 0,69	4.2
Coating strip force		The coating shall be mechanically strippable. Heat stripping may be most appropriate for some coatings	The coating shall be mechanically strippable. Heat stripping may be most appropriate for some coatings	4.2
Tensile strength (median) for 0,5 m specimen length	GPa	≥ 3,8	≥ 3,8	4.2

D.4 Transmission requirements

Table D.3 contains transmission requirements for C4 fibres. The limits apply to both 80 μm and 125 μm nominal cladding diameter sub-categories.

Table D.3 – Transmission requirements for C4 fibres

Attributes	Units	_a Limits	_b Limits	Ref.
Attenuation coefficient at 980 nm	dB/km	≤ 3,0	≤ 3,0	
Mode field diameter range of nominal values at 980 nm	μm	4,0 – 5,0	5,1 – 7,0	
Mode field diameter tolerance	μm	± 0,5	± 0,5	
Fibre cut-off wavelengths	nm	< 980	< 980	
Macro-bending loss, 5 turns on a 10 mm radius mandrel	dB	≤ 0,10 at 1 550 nm [a]	0,01 at 980 nm	

[a] The bend loss at 980 nm for this condition is typically less than 0,001 dB, which is below measurement capability for specification.

D.5 Environmental requirements

The following clauses contain requirements specific to C4 fibre. These limits apply to all sub-categories.

D.5.1 Transmission requirements

Change in attenuation from the initial value shall be less than the values in Table D.4. Attenuation shall be measured periodically during the entire exposure to each environment and after removal.

Table D.4 – Environment dependant transmission requirements for C4 fibres

Environment	Wavelengths nm	Maximum attenuation increase dB/km
Damp heat	980	≤ 0,10
Dry heat	980	≤ 0,10
Change of temperature	980	≤ 0,10

D.5.2 Mechanical requirements – Coating strip force

Mechanical strippability shall be verified following removal of the fibre from the damp heat test.

Bibliography

IEC 60793-1-34, *Optical fibres – Part 1-34: Measurement methods and test procedures – Fibre curl*

IEC 60793-1-42, *Optical fibres – Part 1-42: Measurement methods and test procedures – Chromatic dispersion*

IEC 60793-1-53, *Optical fibres – Part 1-53: Measurement methods and test procedures – Water immersion*

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