IEC 60793-2-20

Edition 2.0 2007-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Optical fibres –
Part 2-20: Product specifications – Sectional specification for category A2 multimode fibres

Fibres optiques –
Partie 2-20: Spécifications de produits – Spécification intermédiaire pour les fibres multimodales de catégorie A2

IEC 60793-2-20:2007

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CONTENTS

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OPTICAL FIBRES –

Part 2-20: Product specifications – Sectional specification for category A2 multimode fibres

FOREWORD

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International Standard IEC 60793-2-20 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition, published in 2002. It constitutes a technical revision.

The main changes from the previous edition are:

– the addition of tensile strength requirement;
– the removal of water immersion requirement;
– the addition of environmental requirements.

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

CDV	Result of voting
86A/1129/CDV	86A/1151/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, published under the general title *Optical fibres,* can be found 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- withdrawn,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.

OPTICAL FIBRES –

Part 2-20: Product specifications – Sectional specification for category A2 multimode fibres

1 Scope

This part of IEC 60793-2 is applicable to optical fibres type A2a, A2b, and A2c. These fibres are used or can be incorporated in information transmission equipment and optical fibre cables (typically up to 2 km).

Three types of requirements apply to these fibres:

– general requirements as defined in IEC 60793-2;
– specific requirements common to the category A2 multimodal fibres covered in this standard and which are given in Clause 3;
– particular requirements applicable to individual fibre types or specific applications, which are defined in the normative family specification annexes.

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

IEC 60793-1-41, *Optical fibres – Part 1-41: Measurement methods and test procedures – Bandwidth*

IEC 60793-1-43, *Optical fibres – Part 1-43: Measurement methods and test procedures – Numerical aperture*

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

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 60793-2:2003, *Optical fibres – Part 2: Product specifications – General*

IEC 62048, *Optical fibres – Reliability – Power law theory*

3 Specifications

3.1 General

The fibre shall consist of a glass core and a glass cladding in accordance with 4.2 of IEC 60793-2.

The term "glass" refers to material usually consisting of non-metallic oxides. The composition of some fibres may be all glass, or glass and glass/hard polymeric composites.

3.2 Dimensional requirements

Relevant dimensional attributes and measurement methods are indicated in Table 1.

Requirements common to all fibres in category A2 appear in Table 2.

Table 3 lists additional attributes that shall be specified by each family specification.

Table 1 – Relevant dimensional attributes and measurement methods

Attribute	Measurement method
Cladding diameter	IEC 60793-1-20
Core diameter	IEC 60793-1-20
Core non-circularity	IEC 60793-1-20
Core-cladding concentricity error	IEC 60793-1-20
Coating diameter	IEC 60793-1-21
Fibre length	IEC 60793-1-22

Table 2 – Requirements common to category A2 fibres

Attribute	Unit	Limits
Core non-circularity	%	≤4
Coating diameter	µm	[a]
Fibre length	km	[b]

[a] The diameter of the coating is dependent on the cable structure and applications.

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

Table 3 – Additional attributes required in the family specifications

Attributes
Cladding diameter
Core diameter

3.3 Mechanical requirements

Relevant mechanical attributes and test methods are indicated in Table 4.

Requirements common to all fibres in category A2 are given in Table 5.

Table 4 – Relevant mechanical attributes and test methods

Attribute	Test method
Tensile strength	IEC 60793-1-31 (0,5 m sample length) Strain rate 3 % to 5 % / minute
Proof test	IEC 60793-1-30

Table 5 – Requirements common to category A2 fibres

Attribute	Unit	Limit
Proof stress level	GPa	≥ 0,345[a]

[a] For the relation between different units, see 4.4 of IEC 62048.

3.4 Transmission requirements

Relevant transmission attributes and measurement methods are given in Table 6.

Requirements common to all fibres in category A2 are given in Table 7.

Table 6 – Relevant transmission attributes and measurement methods

Attribute	Test
Attenuation coefficient[a]	IEC 60793-1-40
Optical continuity	IEC 60794-1-40 or IEC 60793-1-46
Modal bandwidth[a]	IEC 60793-1-41
Numerical aperture[a]	IEC 60793-1-43
Theoretical numerical aperture	IEC 60793-1-20
Change of optical transmission	IEC 60793-1-46
[a] When measuring attenuation and modal bandwidth and numerical aperture, the appropriate launching conditions should be applied - as specified in Annex A of the specified part of IEC 60793-1. The testing length shall be agreed between customer and supplier	

Table 7 – Requirements common to fibres of category A2

Attribute	Unit	Limit
Attenuation coefficient at λ_Y nm[a]	dB/km	≤10
Modal bandwidth at λ_Y nm [a]	MHz·km	≥10
Theoretical numerical aperture	Unitless	0,23 ± 0,03 or 0,26 ± 0,03
[a] The wavelength, λ_Y, shall be agreed between supplier and customer.		

3.5 Environmental requirements

Relevant environmental attributes and test methods are given in Table 8.

Table 8 – Relevant environmental attributes and test methods

Attribute	Test method
Damp heat tests	IEC 60793-1-50
Dry heat tests	IEC 60793-1-51
Change of temperature tests	IEC 60793-1-52

Annex A
(normative)

Family specifications for A2a multimode fibres

The following clauses and tables contain the particular requirements applicable to A2a fibres. Common requirements, repeated here for ease of reference from the sectional specification, are noted by an entry in the "Reference" column. Relevant notes from the sectional specification are not repeated but indicated with a superscript "SS".

A.1 Dimensional requirements

Table A.1 contains dimensional requirements specific to A2a fibres.

Table A.1 – Dimensional requirements specific to A2a fibres

Attribute	Unit	Limit	Reference
Cladding diameter	µm	140 ± 10	
Core diameter	µm	100 ± 4	
Core non-circularity	%	≤4	3.2
Coating diameter	µm	[See 3.2]	3.2
Fibre length	km	[See 3.2]	3.2

A.2 Mechanical requirements

Table A.2 contains mechanical requirements specific to A2a fibres.

Table A.2 – Mechanical requirements specific to A2a fibres

Attribute	Unit	Limit	Reference
Proof stress level	GPa	≥0,345^{SS}	3.3

A.3 Transmission requirements

Table A.3 contains transmission requirements specific to A2a fibres.

Table A.3 – Transmission requirements specific to A2a fibres

Attribute	Unit	Limit	Reference
Attenuation coefficient at λ_Y nm^{SS}	dB/km	≤10	3.4
Modal bandwidth at λ_Y nm^{SS}	MHz·km	≥10	3.4
Theoretical numerical aperture	Unitless	0,23 ± 0,03 or 0,26 ± 0,03	3.4