

INTERNATIONAL STANDARD

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Optical fibre cables –
Part 3-12: Outdoor cables – Detailed specification for duct and directly buried optical telecommunication cables for use in premises cabling

Câbles à fibres optiques –
Partie 3-12: Câbles extérieurs – Spécification particulière pour les câbles optiques de télécommunication destinés à être installés dans des conduites ou à être directement enterrés et utilisés dans le câblage de locaux



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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

J

ICS 33.180.10

ISBN 978-2-83220-509-9

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRE CABLES –

**Part 3-12: Outdoor cables –
Detailed specification for duct and directly buried optical
telecommunication cables for use in premises cabling**

FOREWORD

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International Standard IEC 60794-3-12 has been prepared by subcommittee SC 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2005. This edition constitutes a technical revision.

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

- reference to ISO/IEC 24702;
- reference to Fibre B6 (IEC 60793-2-50);
- reference to Fibre A1a.3 (IEC 60793-2-10);
- reference to the OS2 Fibre as defined by ISO/IEC 11801;
- reference to the OM4 Fibre as defined by ISO/IEC 11801.

This International Standard is to be used in conjunction with IEC 60794-1-1, IEC 60794-1-2 and IEC 60794-3-10.

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

FDIS	Report on voting
86A/1471/FDIS	86A/1486/RVD

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 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 publication will remain unchanged until the stability 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- withdrawn,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.

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OPTICAL FIBRE CABLES –

Part 3-12: Outdoor cables – Detailed specification for duct and directly buried optical telecommunication cables for use in premises cabling

1 Scope

This part of IEC 60794 is a detailed specification for duct and directly buried optical telecommunication cables for use in premises cabling to ensure compatibility with ISO/IEC 11801 and ISO/IEC 24702. Those standards have requirements to ensure that models work for generic cabling and system performances. Values in this standard support these models.

The requirements of the family specification IEC 60794-3-10 are applicable to cables covered by this standard. Particular requirements detailed in Clause 4 of this standard either define a specific option relative to the requirements of IEC 60794-3-10 or define additional requirements.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE These references complete the normative references already listed in the generic specifications IEC 60794-1-1 and IEC 60794-1-2, in the sectional specification IEC 60794-3 and in the family specification IEC 60794-3-10.

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

IEC 60793-2-50:2012, *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 – Cross reference table for optical cable test procedures*

IEC 60794-1-2, *Optical fibre cables – Part 1-2: Generic specification – Cross reference table for optical cable test procedures*¹

IEC 60794-3, *Optical fibre cables – Part 3: Sectional specification – Outdoor cables*

IEC 60794-3-10, *Optical fibre cables – Part 3-10: Outdoor cables – Family specification for duct, directly buried and lashed aerial optical telecommunication cables*

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

¹ IEC 60794-1-2:2003, Second edition has been withdrawn. A third edition, with the revised title *Optical fibre cables - Part 1-2: Generic specification - Cross reference table for optical cable test procedures*, is currently in preparation.

ISO/IEC 24702, Information technology – Generic cabling – Industrial premises

3 General requirements

The cable shall comply with the family specification, IEC 60794-3-10, and meet the requirements which are defined in it, including requirements in the sectional specification, 60794-3. Particular requirements detailed in Clause 4 are optional, relative to the requirements of IEC 60794-3-10, or define additional requirements.

The optical fibre contained in cables covered by this standard shall comply with one of the following standards, and meet the normative requirements defined within them as applicable:

- IEC 60793-2-50:2008, Annex A (Single-mode fibre category B1.1);
- IEC 60793-2-50:2008, Annex C (Single-mode fibre category B1.3) ;
- IEC 60793-2-50:2008, Annex G (Single-mode fibre sub-categories B6 a1 and B6 a2)
- IEC 60793-2-10:2011, Annex A (Multimode fibre sub-category A1a, 50 µm core diameter);
- IEC 60793-2-10:2011, Annex B (Multimode fibre sub-category A1b, 62,5 µm core diameter).

To ensure compatibility with ISO/IEC 11801 and ISO/IEC 24702, optical performance level requirements are presented in terms of the performance classification codes as follows:

- OS1 Single-mode fibre categories B1.1, B1.3 or sub-categories B6 a1, B6 a2;
- OS2 Single-mode fibre category B1.3 or sub-categories B6 a1, B6 a2;
- OM1 Multimode fibre sub-categories A1a, A1b;
- OM2 Multimode fibre sub-categories A1a, A1b;
- OM3 Multimode fibre model A1a.2;
- OM4 Multimode fibre model A1a.3.

NOTE These codes are informative from the perspective of the requirements defined in this detailed specification.

4 Particular requirements

4.1 General

These requirements either define a specific option relative to the requirements of IEC 60794-3-10 or define additional requirements.

4.2 MICE (mechanical, ingress, climatic and chemical and electromagnetic) characteristics

Cables intended for installation in conformity with ISO/IEC 24702, and related standards, may require the specification of additional tests to ensure their suitability in the applicable environments defined by the mechanical, ingress, climatic and chemical and electromagnetic (MICE) classification. Such tests are outside the scope of IEC 60794 cable specifications, and MICE criteria are not part of the requirements for IEC 60794 specifications. The MICE tests may be the same as, similar to, or substantially different from, the tests required by IEC 60794 specifications. Cables manufactured per IEC 60794 specifications may or may not meet the MICE criteria. For supplemental discussion see IEC/TR 62362 [1]².

² Numbers in square brackets refer to the Bibliography.

4.3 Transmission requirements

4.3.1 Attenuation of cabled fibre

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

The fibre category, sub-category or model as applicable shall be agreed between customer and supplier.

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

Fibre	Attenuation coefficient at 850 nm	Attenuation coefficient at 1 300 nm	Performance code
IEC 60793-2-10:2011, A1a.1	3,5	1,5	OM1, OM2
IEC 60793-2-10:2011, A1a.2	3,5	1,5	OM1, OM2, OM3
IEC 60793-2-10:2011, A1a.3	3,5	1,5	OM1, OM2, OM3, OM4
IEC 60793-2-10:2011, A1b	3,5	1,5	OM1, OM2

Table 2 – Single-mode maximum cable attenuation coefficient (dB/km)

Fibre	Wavelengths nm	Maximum attenuation coefficient	Performance code
IEC 60793-2-50:2008, B1.1, B1.3, B6 a1 or B6 a2	1 310, 1 550	1,0	OS1
IEC 60793-2-50:2008, B1.3, B6 a1 or B6 a2	1 310, 1 383, 1 550	0,4	OS2

NOTE Optical fibre B6 a is recommended when it is expected that the optical fibre or the cable will have to support smaller bend radii than 25 mm.

4.3.2 Fibre bandwidth requirements

There are no bandwidth requirements on single-mode fibre.

For cables containing multimode fibres, the uncabled fibre shall be specified at one of performance levels defined in Table 3 in terms of minimum bandwidth (MHz × km), wavelength, and type of measurement.

The fibre category, sub-category or model as applicable and performance level shall be agreed between customer and supplier.

Table 3 – Minimum multimode fibre bandwidth (MHz × km)

Fibre	Nominal core diameter µm	Overfilled bandwidth at 850 nm	Overfilled bandwidth at 1 300 nm	Effective modal bandwidth at 850 nm	Performance code
IEC 60793-2-10:2011, A1a.1	50	200	500	N/A	OM1
IEC 60793-2-10:2011, A1a.1	50	500	500	N/A	OM2
IEC 60793-2-10:2011, A1a.2	50	1 500	500	2 000	OM3
IEC 60793-2-10:2011, A1a.3	50	3 500	500	4 700	OM4
IEC 60793-2-10:2011, A1b	62,5	200	500	N/A	OM1
IEC 60793-2-10:2011, A1b	62,5	500	500	N/A	OM2
N/A Not applicable.					

4.3.3 Polarization mode dispersion (PMD) requirements

Cables containing single-mode fibres shall meet the PMD requirement of IEC 60794-3. This is given as a link design value, PMD_Q , with a maximum of $0,5 \text{ ps/km}^{1/2}$ allowed.

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- [1] IEC/TR 62362, *Selection of optical fibre cable specifications relative to mechanical, ingress, climatic or electromagnetic characteristics – Guidance*
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