

INTERNATIONAL STANDARD

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**Optical fibre cables –
Part 2-30: Indoor cables – Family specification for ribbon cables**

**Câbles à fibres optiques –
Partie 2-30: Câbles intérieurs – Spécification de famille pour les câbles à rubans**

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INTERNATIONAL
ELECTROTECHNICAL
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COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

S

ICS 33.180.10

ISBN 978-2-83220-606-5

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRE CABLES –

**Part 2-30: Indoor cables –
Family specification for ribbon cables**

FOREWORD

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International Standard IEC 60794-2-30 has been prepared by sub-committee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2003. It constitutes a technical revision. The main changes are listed below:

- a) subclause 5.4 has been detailed according to the fibre type;
- b) Annex A has been added to show an example of cable construction;
- c) Annex B has been added which is a blank detail specification including Mice classification and requirements;
- d) a bibliography has been added.

This standard shall be used in conjunction with IEC 60794-1-1 and IEC 60794-1-2, and IEC 60794-2.

This bilingual version (2013-01) corresponds to the monolingual English version, published in 2008-10.

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

FDIS	Report on voting
86A/1233/FDIS	86A/1244/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.

The French version of this standard has not been voted upon.

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 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

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OPTICAL FIBRE CABLES –

Part 2-30: Indoor cables –

Family specification for ribbon cables

1 Scope

This part of IEC 60794 is a family specification which covers optical fibre ribbon cables for indoor use. The requirements of the sectional specification IEC 60794-2 are applicable to cables covered by this standard.

Clause B.2 contains requirements that supersede the normal requirements in case the cables are intended to be used in installations governed by the MICE table of ISO/IEC 24702.

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.

These documents complete the normative references already listed in the generic specification (IEC 60794-1-1, Clause 2, and IEC 60794-1-2, Clause 2) or in the sectional specification (IEC 60794-2, Clause 2).

IEC 60304:1982, *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 60793-1-40, *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 – Cutoff 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 60794-1-1, *Optical fibre cables – Part 1-1: Generic specification – General 86A/1054/NP*

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

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

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

IEC 60811-1-1:1993, *Common test methods for insulating and sheathing materials of electric cables and optical cables – Part 1-1: Methods for general application – Measurement of thickness and overall dimensions – Tests for determining the mechanical properties*

IEC 60811-1-4:1985, *Common test methods for insulating and sheathing materials of electric cables – Part 1: Methods for general application – Section Four: Tests at low temperatures.*

3 Construction

3.1 General

In addition to the constructional requirements in IEC 60794-2, the following considerations apply to indoor ribbon cables.

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

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

It shall be possible to identify each individual fibre throughout the length of the cable.

3.2 Optical fibres and primary coating

Multimode or single-mode optical fibres meeting the requirements of IEC 60793-2 shall be used.

3.3 Buffer

None.

3.4 Ruggedized fibre

None.

3.5 Slotted core

None.

3.6 Tube

None.

3.7 Stranded loose tube

None.

3.8 Ribbon structure

The ribbon structure shall conform to 6.5 and 8.2.3 of IEC 60794-3. Fibres shall be formed into units of typically two, four, six, eight, or twelve fibres each. The fibres within the units shall remain parallel and not cross over. An example of a ribbon construction is shown in Figure A.1

3.9 Strength and anti-buckling members

The optical fibre ribbon cable may incorporate a tensile strength member. The strength member can be a layer of suitable material, longitudinally or helically applied, and/or may be embedded in the overall sheath.

3.10 Ripcord

None.

3.11 Sheath

The optical fibre ribbon shall be uniformly covered with a protective sheath generally as shown in Figure A.1.

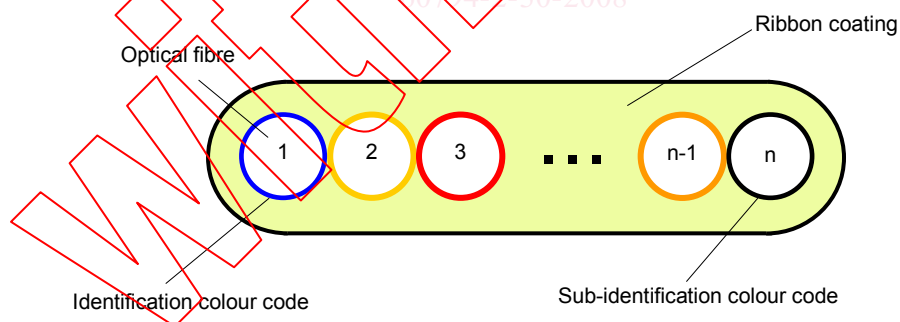
3.12 Sheath marking

If required, the cable shall be marked as agreed between the customer and the supplier.

3.13 Identification

The coated fibre shall be distinguishable by means of colour coding and positioning. For example (see Figure 1):

- a fibre ribbon has an identification coloured fibre on one side and a sub-identification coloured one on the other side;
- the identification and the sub-identification coloured fibres are the first and the last in the fibre ribbon, respectively;
- any colour of the identification colours group is different from that of the sub-identification colours group;
- the colour types and the order used for identification and sub-identification should be agreed between the customer and the supplier. The colours of the other fibres shall be agreed by the customer and/or the supplier;
- the colour range used is similar to the first 12 colours described in Table 1 of IEC 60794-2, i.e. blue, yellow, red, white, green, violet, orange, grey, turquoise, black, brown and pink.



NOTE 1 The identification colour enables each fibre ribbon to be identified individually within a group of ribbons.

NOTE 2 The sub-identification colour shows the ribbon group.

NOTE 3 The identification and the sub-identification colour in a ribbon enables each fibre to be identified individually within the ribbon.

Figure 1 – Example of identification by means of colour coding and positioning

Other methods of identification are under consideration.

3.14 Example of cable construction

An example of a ribbon cable construction is shown in Figure A.1. Other configurations are not precluded if they meet the mechanical, environmental and transmission requirements given in this specification.

4 Dimensions

4.1 Optical fibres and primary coating

The dimensions of the individual primary coated fibres in the finished product shall be in accordance with IEC 60793-2.

4.2 Ribbon structural geometry

The ribbon geometry shall conform to 8.2.3 of IEC 60794-3.

4.3 Optical fibre ribbon cable

Unless otherwise specified, the dimensions and the structural geometry of optical fibre ribbon cables shall be as shown in Table 1.

Table 1 – Dimensions of optical fibre ribbon cables

Number of fibres	Optical fibre ribbon cables			
	Width		Height	
	mm		mm	
	Nominal	Maximum tolerance	Nominal	Maximum tolerance
2	3,0 - 3,5	± 0,4	2,3 - 2,7	± 0,3
4	3,0 - 3,5	± 0,4	2,3 - 2,7	± 0,3
6	3,5 - 4,0	± 0,4	2,3 - 2,7	± 0,3
8	2,5 - 4,5	± 0,4	0,9 - 3,0	± 0,3
12	3,5 - 5,5	± 0,4	0,9 - 3,0	± 0,3

NOTE These dimensions apply to the ribbon cable including the sheath and any strength members.

5 Tests

Compliance with the relevant detail specification requirements shall be verified by carrying out tests selected from the following subclauses. It is not intended that all the tests shall be carried out; the tests which are to be performed and the frequency of testing shall be agreed between the customer and the supplier.

5.1 Dimensions

The dimensions and structural geometry of optical fibre ribbon can be verified with a type test described in 8.2.3 of IEC 60794-3 to establish and assure proper control of the ribbon manufacturing process. Once the process is established, and in order to ensure functional performance, the dimensions of ribbons may be controlled and verified, for final inspection purpose, with a dial gauge as described in Method G4 of IEC 60794-1-2. The size of optical fibre ribbon cable, width and height, shall be measured in accordance with the methods of IEC 60811-1-1.

5.2 Mechanical requirements

Some of the following tests can be performed on a short sample length of optical fibre ribbon cable which is still an integral part of a longer length. For testing, the force shall be applied on the flat sides of the cable. Thus it becomes possible to detect permanent changes in attenuation. The wavelength and maximum increase in attenuation change can be agreed between the customer and the supplier.

5.2.1 Tensile performance

Method:	IEC 60794-1-2-E1A
Diameter of chuck drums not lower than the minimum dynamic bending and transfer devices:	diameter specified for the cable.
Velocity of transfer device:	either 100 mm/min or 100N/min
Load:	200 N applied for 5 min
Length of sample:	sufficient to achieve the desired accuracy of measurement of attenuation and shall be agreed between the customer and the supplier
Requirement:	no change in attenuation after the test, and there shall be no damage to the cable elements

5.2.2 Crush

Method:	IEC 60794-1-2-E3
Force:	500 N
Duration:	1 min
Length between test locations:	500 mm
Requirement:	no change in attenuation after the test, and there shall be no damage to the cable elements

NOTE The force is applied on the flat sides of the cable.

5.2.3 Impact

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

NOTE The force is applied on the flat sides of the cable.

5.2.4 Bend

Method:	IEC 60794-1-2-E11A
Mandrel diameter:	50 mm
Number of turns per helix:	6
Number of cycles:	10
Requirements:	no fibre breakage

NOTE The bending is applied in the vertical direction to the flat sides of the cable.

5.2.5 Repeated bending

Method:	IEC 60794-1-2-E6
Bending radius:	100 mm
Number of cycles:	300
Mass of weights:	2 kg
Requirement:	no fibre breakage

NOTE The bending is applied in the vertical direction to the flat sides of the cable.

5.2.6 Bending under tension

None.

5.2.7 Bending at low temperature

Method:	IEC 60794-1-2-E11A (see also IEC 60811-1-4, Clause 8)
Bending radius:	10 times cable diameter (for flat cables, the diameter is the minor dimension)
Number of cycles:	2
Test temperature:	0 °C, –10 °C or –15 °C depending on application and customer requirements
Number of turns per helix:	according to Clause 8 of IEC 60811-1-4
Requirements:	in addition to the requirement of Clause 8 of IEC 60811-1-4, no fibre shall break during the test

5.2.8 Flexing

Method:	IEC 60794-1-2-E8
Number of cycles:	300
Pulley diameter:	100 mm
Mass of weight:	2 kg
Requirement:	no fibre breakage

NOTE The bending is applied in the vertical direction to the flat sides of the cable.

5.2.9 Torsion

Method:	IEC 60794-1-2-E7
Number of cycles:	20
Distance between fixed and rotation clamp:	250 mm
Tension load:	20 N
Requirement:	no fibre breakage

5.2.10 Kink

None.

5.3 Environmental requirements

5.3.1 Temperature cycling

Method: IEC 60794-1-2-F1