

TECHNICAL REPORT



Guidance on colour coding of optical fibre cables

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IEC TR 63194:2019

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

GUIDANCE ON COLOUR CODING OF OPTICAL FIBRE CABLES

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IEC TR 63194, which is a Technical Report, has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

The text of this Technical Report is based on the following documents:

Draft TR	Report on voting
86A/1870/DTR	86A/1891A/RVDTR

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

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://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- withdrawn,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.

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INTRODUCTION

0.1 General

Colour coding of fibres is a useful method to uniquely identify fibres within a cable. For most fibre system architectures, such identification is considered essential.

A number of schemes for fibre identification have evolved in various regions. Attempts to unify the schemes have not yet been successful, as they are embedded in the system architecture.

Jacket colour coding is frequently used for a variety of reasons – most commonly in indoor cables.

Colour coding of both fibres and jackets has been addressed in IEC 60794-2 [5] [6]¹ and in IEC 60794-3-11. The intent of this document is to collect that and other relevant information for application to all cable types defined by IEC 60794 (all parts).

0.2 Background in other documents

IEC 60304 [1] defines the 12 colours currently identified for fibre identification, but does not specify which colour is for which fibre number. IEC 60794-2:2002 [5] does define a colour code, but this has been determined to have been construed as not representing any existing major colour code; furthermore, it was never adopted by any region. Further discussion of both documents is included in the text that follows.

IEC 60794-1-1 [4] contains specific language on the intent of colour coding, and notes that it is "as agreed". This document expands on that intent, offering several specific examples that exist in the various regions. Where the information is available, this document notes the regional specifications from which these examples are taken.

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¹ Numbers in square brackets refer to the Bibliography.

GUIDANCE ON COLOUR CODING OF OPTICAL FIBRE CABLES

1 Scope

This document examines the need for and intent of colour coding of optical fibre cables. Further, this document lists the major colour codes in various regions throughout the world. Noting that decades of discussion of a universal recommended colour coding scheme has failed to bring about an agreement, this document does not intend to promote any listed colour code above any other.

This document includes regional information on the colour coding of units when different from the fibre code, and of jackets to convey information about the types of fibres within, or the types of performance expected. It also includes information on colours beyond the basic 12 set out in IEC 60304.

This document is not a normative document, but, rather, a guide to the subject of colour coding of cables.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Rationale

The need to uniquely identify a particular fibre within a cable is a common and rational requirement for cable standards. The determination of which fibre is which – without having to resort to "ringing it out" – is a key criteria in cable system management. A definition of an agreed cable colour coding scheme has been discussed in past years. But it has not been possible to reach agreement within the IEC because several embedded regional coding schemes exist that are part and parcel of the fibre system architecture.

The regional coding schemes are presented in Annexes A to G, as follows:

- Annex A: Germany;
- Annex B: North America;
- Annex C: Sweden;
- Annex D: Switzerland;
- Annex E: China;
- Annex F: Japan;
- Annex G: Brazil.

The rationale of a colour coding scheme is that each fibre within a cable be uniquely identified. This concept requires that each fibre in a unit be identified by colour or position or both, and that each unit also be identified – again, by colour or position or both. The combination of the two will uniquely identify any particular fibre within a cable. The scheme for the fibre and for the unit may or may not be the same.

Note that IEC 60304 defines the 12 colours for fibre identification, but does not specify which colour is for which fibre number. Also note that IEC 60794-3-11:2010 [7], 6.1.3.1, lists the 12 colours, but specifically leaves the coding to being "as agreed".

The only definition of a colour code in the IEC 60794 system to date appears in IEC 60794-2:2017, 5.13. IEC 60794-2:2002, and earlier, contained a colour code for fibre identification; edition 4.0 (2017) does not contain that code. That code has been anecdotally described as having been "made up" to specifically not conform to any existing code, in hopes that it might become an agreed default. That agreement never occurred, therefore, it was dropped from edition 4.0. The stated colour codes stated in IEC 60794-2:2017 [6] are for fibre, buffered fibre, ribbons, unit, ruggedized fibre elements and jacket colours, based on fibre type.

The current work to restructure the IEC 60794-1 series – especially the revision of IEC 60794-1-1 – would suggest that the colour code should be a basic criterion addressed in the general specification.

Contemporary proposals with regards to the latest edition of IEC 60794-1-1 seek to move these criteria to IEC 60794-1-1 [4] and to this document, presuming some future revision of IEC 60794-2:2017. They present the necessary changes to IEC 60794-1-1 to standardize the "as agreed" approach and refer to this document for details. In view of current and future revisions, it may be that IEC 60794-1-1 will be normative regarding these requirements.

In addition, a jacket, sub-cable jackets, tube or buffer colour may be used to identify the type of fibre within the cable. This type of coding may or may not conflict with the unique identification rationale of the coding scheme, depending on the cable type.

5 Fibre colour coding

5.1 Intent

The intent of fibre colour coding is to uniquely identify each fibre in a cable. Schemes meeting this intent require either positive identification (such as a colour) or default identification (such as positional coding).

Fibre colours are generally defined by up to 12 colours, as per IEC 60304. Beyond 12 colours, schemes such as dashes, hachures, or multi-colours have been used. For special applications, such as hermetically-sealed fibres, additional colours have been used. Subclause 5.3 proposes colours 13 through 16, based on these applications.

Fibre coding schemes for cables with larger numbers of fibres will frequently require similar identification of the units in order to achieve unique fibre-level identification. Unit coding is addressed in Clause 6.

Colour coding of buffered fibres generally follows the scheme for fibres.

5.2 Historic IEC 60794-2 colour code (for guidance)

Table 1 shows the colour code published in IEC 60794-2:2002, 3.13. While there is no known use of this scheme, it is presented, here, for completeness.

NOTE It is said, anecdotally, that this code was created to be unique and not align with any major known code in the hope that it might be adopted without prejudice. This has proven not to have been successful.

Table 1 – Colour coding sequence for individual fibres or buffers

Fibre number	Colour
1	Blue
2	Yellow
3	Red
4	White
5	Green
6	Violet
7	Orange
8	Grey
9	Turquoise
10	Black
11	Brown
12	Pink
For fibre counts above 12, additional groups of 12 fibres should be identified by combining the above sequence with an added identification (for example, ring marking, dashed mark, or tracer).	

5.3 Colour coding for fibres 13 through 16

For colour coding of fibres or other elements in units defined beyond the basic 12 of IEC 60304, the colours of Table 2 can be used.

Table 2 – Colours for individual fibres, buffers, or other elements 13 through 16

Colour
Olive
Magenta
Tan
Lime

5.4 Other coding schemes

For future study.

6 Unit and group coding

6.1 Unit coding

Units are primary groupings of individual fibres. Examples of such units include buffer tube, bundles, ribbons and the like. Coding of units may be required to achieve unique fibre identification as per Clause 5. Unit coding follows the intent of the regional coding scheme, as in Clause 5.

Coding may be accomplished by colouring the units, buffer tubes, threads, etc. Coding may be accomplished using printed identifications, as on ribbons or tubes. Coding may use a positional identification scheme, as in slotted cores.