

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Optical fibre cables – **STANDARD PREVIEW**
Part 1-2: Generic specification – Basic optical cable test procedures – General
guidance (standards.iteh.ai)

Câbles à fibres optiques – IEC 60794-1-2:2017
Partie 1-2: Spécification générique – Procédures fondamentales d'essais des
câbles optiques – Lignes directrices générales



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRE CABLES –

**Part 1-2: Generic specification –
Basic optical cable test procedures –
General guidance**

FOREWORD

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International Standard IEC 60794-1-2 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This fourth edition cancels and replaces the third edition published in 2013 and IEC 60794-1-20 published in 2014. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition and to IEC 60794-1-20:

- a) the multiple cross-reference tables have been deleted and replaced with a higher level one related to the generic standards;
- b) all pertinent text from IEC 60794-1-20 has been included;
- c) standard optical test wavelengths have been introduced;
- d) this document has been streamlined by cross-referencing IEC 60794-1-1;

- e) the "No change in attenuation" definitions contained in IEC 60794-1-20 have been transferred to IEC 60794-1-1;
- f) the title has been modified to reflect the contents of the new edition.

This International Standard is to be used in conjunction with IEC 60794-1-1:2015.

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

FDIS	Report on voting
86A/1767/FDIS	86A/1775/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 in the 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- withdrawn,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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INTRODUCTION

IEC 60794-1-2:2013 comprised a detailed cross-reference table to the new document set, and general guidance was given in IEC 60794-1-20. These two specifications have been combined in this document, which allows for IEC 60794-1-20 to be withdrawn.

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OPTICAL FIBRE CABLES –

Part 1-2: Generic specification – Basic optical cable test procedures – General guidance

1 Scope

This part of IEC 60794-1 applies to optical fibre cables for use with telecommunications equipment and devices employing similar techniques, and to cables having a combination of both optical fibres and electrical conductors.

The prime objective of this document is to provide the end user with an overview about the content of different parts of the IEC 60794-1 series numbered -2X. Table 1 shows the different parts.

Table 1 – Document overview

Test methods	IEC reference
General guidance	IEC 60794-1-2
Methods E – Mechanical	IEC 60794-1-21
Methods F – Environmental	IEC 60794-1-22
Methods G – Cable elements	IEC 60794-1-23
Methods H – Electrical	IEC 60794-1-24
NOTE Several numbers in the test method numbering sequence are missing. The reasons for these omissions are historical. To avoid confusion, the existing numbering sequence has been retained.	

These documents define test procedures to be used in establishing uniform requirements for the geometrical, transmission, material, mechanical, ageing (environmental exposure) and climatic properties of optical fibre cables, and electrical requirements where appropriate.

Throughout the documents, the wording "optical cable" can also include optical fibre units, microduct fibre units, etc.

The secondary objective of this document is to provide the end user with useful guidance when testing optical fibre cables.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60793-1-40, *Optical fibres – Part 1-40: Measurement methods and test procedures – Attenuation*

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

IEC 60793-2-40, *Optical fibres – Part 2-40: Product specifications – Sectional specification for category A4 multimode fibres*

IEC 60794-1-1:2015, *Optical fibre cables: Generic specification – General*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60794-1-1 apply.

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 General guidance

4.1 Test procedure format

The standard descriptive order of each test method is in general as follows: object, sample, apparatus, procedure, requirement, details to be specified, details to be reported. Additional clauses may be inserted, whilst maintaining this general order.

4.2 Standard atmospheric conditions

Two sets of allowable ambient conditions for cable testing are defined for use in testing in this document:

[IEC 60794-1-2:2017](https://standards.iteh.ai/catalog/standards/sist/bcc30ec6-c73c-4e1e-82ed-a0190e61aac8/iec-60794-1-2-2017)

Standard test conditions

- Temperature: $+23\text{ °C} \pm 5\text{ °C}$
- Pressure: site ambient
- Relative humidity: 20 % to 70 %

Expanded test conditions

- Temperature: $+25\text{ °C} \pm 15\text{ °C}$
- Pressure: site ambient
- Relative humidity: 5 % to 95 %

Unless otherwise stated in the particular test, the expanded test conditions shall be used as the default atmospheric conditions when performing tests. The standard test conditions are only for use when specifically requested.

NOTE A tightly-controlled temperature range is considered unnecessary for most cable tests.

Consideration shall be given to the effects of temperature differences and variations on electronic and optical test equipment that may be used in performing the tests. It may be necessary to maintain such equipment at the controlled atmospheric conditions by appropriate means.

4.3 Symbols and abbreviated terms

Symbols and abbreviated terms are given in IEC 60794-1-1.

4.4 Safety and environmental aspects

All applicable safety and environmental regulations shall be met.

4.5 Calibration

4.5.1 Calibration process

Ensure the apparatus is calibrated and adjusted in accordance with the manufacturer's instructions before use in order to minimize measurement uncertainty.

Record relevant information of the calibration process, such as the calibrated value and uncertainty of the reference material or test equipment used.

4.5.2 Assessment of uncertainties [1]¹

Measurement uncertainty may be defined as the range within which the true value of a measured quantity (the measure) is estimated to lie, within a given likelihood (or confidence level). The measurement uncertainty normally comprises several components, some of which may be estimated using statistical techniques (known as type A uncertainties) whilst others may be estimated on the basis of experience or other information (known as type B uncertainties). Components of uncertainty, or variance, are additive, and a confidence interval may be calculated for the measurements based on the sum of the variance components.

A typical build-up of uncertainty may include the following sources of uncertainty:

- calibration uncertainty of reference materials or equipment used – normally stated on the calibration certificates of the standards;
- transfer uncertainty – estimated changes in the certified values of reference materials or equipment since they were calibrated;
- operational uncertainty – estimated effects of environmental conditions, such as temperature and humidity;
- statistical (random) uncertainty in the measurement of the specimen and the calibration standard – due to, for example, electrical noise, vibration, data quantization, etc.

4.6 Preconditioning

Most tests are performed at ambient conditions or begin at ambient conditions, as per 4.2. The intent is that the preconditioning achieve thermal stability. Unless otherwise specified, samples shall be preconditioned at ambient conditions for a minimum of 12 h prior to the test.

4.7 Guide to qualification sampling

For qualification purposes, it should only be necessary to test a subset of the fibre and/or element counts that represent a product range. Not all fibres within a cable are required to be tested to qualify a cable. A guide to qualification sampling is found in IEC 60794-1-1. Not all tests are required for a cable design. It depends upon the application and relevant specification.

4.8 Optical launch conditions

Optical measurements shall follow conditions as described in the IEC 60793-1 series, in particular IEC 60793-1-40 for attenuation and IEC 60793-1-46 for monitoring changes in optical transmittance by transmitted power or backscattering.

¹ Numbers in square brackets refer to the Bibliography.

4.9 Standard optical test wavelengths

The standard optical test wavelengths for type testing of cabled optical fibre, performed per IEC 60794-1-1, are as given in Table 2, unless otherwise specified in the individual test or in the detail specification.

Table 2 – Standard optical test wavelengths

Fibre type	Wavelength
Single-mode	1 550 nm \pm 10 nm
Multimode	1 300 nm \pm 20 nm
NOTE Other test wavelengths can require different tolerance ranges.	

For multimode fibres that are optimized for wavelengths lower than 1 300 nm (e.g. 850 nm) the highest specified wavelength shall be tested. In this case, the 1 300 nm test criteria specified in the relevant specification shall be used. Category A4 multimode fibres shall be tested at the applicable sub-category wavelength given in IEC 60793-2-40.

Specified changes in optical performance include an allowance for measurement repeatability.

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