IEC 60794-1-404

Edition 1.0 2022-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Optical fibre cables –
Part 1-404: Generic specification – Basic optical cable test procedures – Electrical test methods – Current-temperature test, method H4

Câbles à fibres optiques –
Partie 1-404: Spécification générique – Procédures fondamentales d'essais des câbles optiques – Méthodes d'essais électriques – Essai de courant-température, méthode H4

IEC 60794-1-404:2022-02(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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IEC 60794-1-404 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
86A/2170/FDIS	86A/2185/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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 document will remain unchanged until the stability date indicated on the IEC website under 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- withdrawn,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.

OPTICAL FIBRE CABLES –

Part 1-404: Generic specification – Basic optical cable test procedures – Electrical test methods – Current-temperature test, method H4

1 Scope

This part of IEC 60794 defines a test standard to determine the optical performance and temperature characteristics of a hybrid cable under the maximum current.

This document applies to optical phase conductor (OPPC). An optical phase conductor is made of multiple metallic wires that are exposed to the environment without any insulating or protective sheath and contain optical fibres.

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

IEC TR 61597, *Overhead electrical conductors – Calculation methods for stranded bare conductors*

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 Method H4 – Current-temperature test

4.1 Object

The object of this test is to verify that the temperature of the sample and the attenuation of monitored optical fibres comply with the general optical requirements during the maximum current test.

4.2 Lab conditions

Tests shall be carried out in a natural convection lab, and the temperature shall be 23 °C ± 5 °C without wind or solar radiation.

4.3 Sample

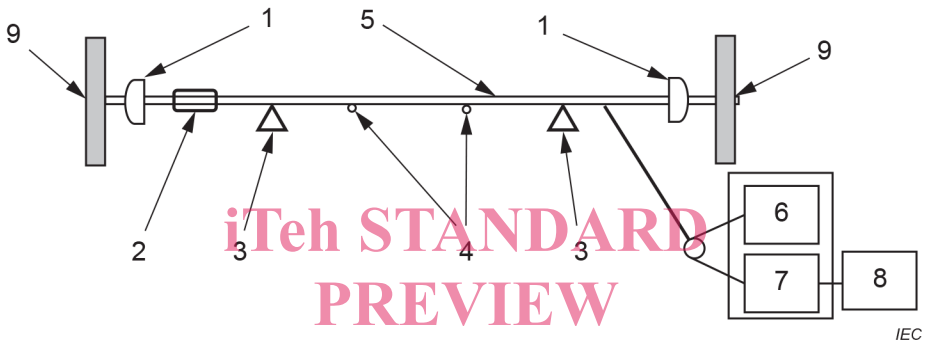
Preparation of the sample length and ends should ensure that flashover along its surface or breakdown does not occur during the test.

The test length of the sample shall be no less than 6 m.

The test length of the optical fibre shall be no less than 100 m, and several fibres can be spliced together if necessary. At least one fibre shall be tested from each buffer tube, fibre bundle or cable element.

4.4 Apparatus

Test apparatus shall provide the frequency of AC voltage, voltage stability, and keep the current value within the specified value ±3 % during the test. A typical test set-up is shown in Figure 1.



Key

1 electrical isolator
2 loop-spliced fibre
3 holder
4 thermocouple
5 sample
6 light source
7 optical power meter
8 data recorder
9 fixed end

Figure 1 – Current-temperature test set-up

4.5 Procedure

– At least two thermocouples shall be placed in the sample. One thermocouple shall be located in an inner layer and another one in the outer layer. Thermocouples shall be placed in the section between both ends of the cable under test to be able to properly monitor the cable temperature.

– The initial sample temperature shall be equal to the value specified by the manufacturer and agreed with the customer.

– Fix both ends of the sample with suitable clamps, allow fibre leads to be long enough for easy testing, apply a load no less than 20 % RTS to the sample, and keep the tension steady.

– Apply current carrying capacity calculated at operational level per IEC TR 61597 or agreed between customer and manufacturer.

– After temperature stabilization, maintain test condition for 24 h.

The temperature shall be monitored every 5 min in the different cable layers of the sample.

Optical attenuation of the test fibres shall be monitored continuously at 1 550 nm in accordance with IEC 60793-1-46 since applying current until the end of the test. A different monitoring wavelength can be used if agreed between customer and manufacturer.

4.6 Requirements

Unless otherwise specified by the relevant specification, a permanent or temporary increase in optical attenuation greater than 0,15 dB/km of test fibre, at 1 550 nm nominal wavelength, shall constitute a failure.

The temperature on the conductor shall not exceed 85 °C or the value agreed between customer and manufacturer during the test.

4.7 Details to be specified

The following details, as applicable, shall be specified in the relevant specification:

a) diameter of conductor;
b) electrical resistance of conductor at a temperature;
c) speed of cross wind;
d) intensity of solar radiation;
e) solar absorption coefficient;
f) emissivity with respect to black body;
g) aluminium temperature;
h) rated tensile strength (RTS);
i) initial sample temperature;
j) acceptance criteria (e.g. maximum increase in optical attenuation, maximum temperature on the conductor).

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