

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

**Optical fibre cables –  
Part 1-209: Generic specification – Basic optical cable test procedures –  
Environmental test methods – Ageing, method F9**

**Câbles à fibres optiques –  
Partie 1-209: Spécification générique – Procédures fondamentales d’essai des  
câbles optiques – Méthodes d’essai d’environnement – Vieillessement, méthode  
F9**

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## OPTICAL FIBRE CABLES –

**Part 1-209: Generic specification – Basic optical cable test procedures –  
Environmental test methods – Ageing, method F9**

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IEC 60794-1-209 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics. It is an International Standard.

This document partially cancels and replaces IEC 60794-1-22:2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 60794-1-22:2017:

- a) the ambient temperature test condition has been defined as per IEC 60794-1-2;
- b) all the maximum allowable attenuation increase values for single-mode and multimode fibres have been deleted, and have been included in the list of details to be specified.

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

Draft	Report on voting
86A/2443/FDIS	86A/2466/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/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](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
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## INTRODUCTION

This document cancels and replaces method F9 of IEC 60794-1-22:2017, which will be withdrawn. It includes an editorial revision, based on the new structure and numbering system for optical fibre cable test methods. Additionally, technical changes were implemented. The environmental tests contained in IEC 60794-1-22:2017 will be individually numbered in the IEC 60794-1-2xx series. Each test method is now considered to be an individual document rather than part of a multi-test method compendium. Full cross-reference details are given in IEC 60794-1-2.

The numbering of this test method continues the F-series numbering sequence of IEC 60794-1-22:2017.

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## OPTICAL FIBRE CABLES –

### Part 1-209: Generic specification – Basic optical cable test procedures – Environmental test methods – Ageing, method F9

#### 1 Scope

This part of IEC 60794-1 defines test procedures to be used in establishing uniform requirements for the environmental performance of:

- optical fibre cables for use with telecommunication equipment and devices employing similar techniques; and
- cables having a combination of both optical fibres and electrical conductors.

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

This document defines a test standard to determine cable aging performance by high temperature exposure and temperature cycling in order to simulate lifetime behaviour of the attenuation of cables, or physical attributes.

See IEC 60794-1-2 for a reference guide to test methods of all types and for general requirements and definitions.

#### 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 60304, *Standard colours for insulation for low-frequency cables and wires*

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

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

IEC 60794-1-201, *Optical fibre cables – Part 1-201: Generic specification – Basic optical cable test procedures – Environmental test methods – Temperature cycling, method F1*

#### 3 Terms and definitions

No terms and definitions are listed in this document.

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

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



## 4 Method F9 – Ageing

### 4.1 Object

This test method applies to optical fibre cables which are tested by high temperature exposure and temperature cycling in order to simulate lifetime behaviour of the attenuation of cables, or physical attributes specified in the relevant specification.

End of life performance is not predicted by this test. However, the data may be useful in modelling performance over the lifetime of the cable.

### 4.2 Sample

The sample requirements shall be the same as for IEC 60794-1-201, method F1: Temperature cycling. If this ageing method is used in series with IEC 60794-1-201, and method F1 is performed first, the same sample may be used for this ageing test.

### 4.3 Apparatus

The apparatus shall be as described in IEC 60794-1-201, method F1.

### 4.4 Procedure

Method F9 is frequently used as part of an overall procedure with IEC 60794-1-201, method F1. If this is the case, method F9 shall be carried out after the temperature cycling test described in IEC 60794-1-201, method F1. In this case, the initial attenuation value for F9 shall be that measured at the last ambient point per IEC 60794-1-201, method F1. If method F9 is not used in conjunction with IEC 60794-1-201, method F1, the attenuation shall be measured at the standard ambient temperature condition defined in IEC 60794-1-2 as the initial attenuation value.

The cable shall be exposed to the temperature and time period as specified in the relevant specification. If not specified in the relevant specification, the default shall be 85 °C for 168 hrs. Optical measurements are not required during this phase.

After the ageing steps, perform a temperature cycling test according to IEC 60794-1-201, method F1. Perform two cycles, at the same temperatures used prior to the ageing steps or as agreed between customer and supplier (if ageing is conducted separately). Optical measurements are not required during these two cycles. At the end of the last cycle, the temperature shall be lowered to ambient temperature, which shall be maintained for 24 h, and the change in attenuation shall be measured. The number of fibres tested shall conform to IEC 60794-1-1.

### 4.5 Requirement

The acceptance criteria for the test shall be as stated in the relevant specification. Typical failure modes include loss of optical continuity, degradation of optical transmittance or physical damage to the cable. The change in attenuation shall be calculated with respect to the initial attenuation value attained in 4.4.

After measuring change in attenuation, an appropriate section of the cable shall be dissected. Any elements of the cable which are colour coded (fibres, buffer tubes, sheath) shall be examined as per Annex A.

#### 4.6 Details to be specified

The relevant specification shall include the following:

- a) the exposure temperature, if not 85 °C;
- b) the exposure time, if not 168 h;
- c) the maximum change in attenuation allowed at the specified wavelength;
- d) any tests of physical attributes in addition to those of 4.5;
- e) test parameters to perform temperature cycling according to IEC 60794-1-201, method F1.

#### 4.7 Details to be reported

The test report shall include the following information:

- a) the exposure temperature;
- b) the exposure time;
- c) the maximum change in attenuation at the specified wavelength;
- d) any tests of physical attributes in addition to those of 4.5;
- e) test parameters to perform temperature cycling according to IEC 60794-1-201, method F1.

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