IEC 60793-1-54

Edition 3.0 2018-01

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Optical fibres –
Part 1-54: Measurement methods and test procedures – Gamma irradiation

Fibres optiques –
Partie 1-54: Méthodes de mesure et procédures d'essai – Irradiation gamma

IEC 60793-1-54:2018-01(en-fr)

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FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60793-1-54 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This third edition cancels and replaces the second edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) test conditions related to photobleaching have been changed;
b) the test length has been modified to yield a total induced attenuation in the test sample at the end of the irradiation between 3 dB and 10 dB.

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

FDIS	Report on voting
86A/1833/FDIS	86A/1848/RVD

Full information on the voting for the approval of this International Standard 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.

A list of all parts in the IEC 60793 series, published under the general title *Optical fibres*, 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 "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.

OPTICAL FIBRES –

Part 1-54: Measurement methods and test procedures – Gamma irradiation

1 Scope

This document outlines a method for measuring the steady state response of optical fibres and optical cables exposed to gamma radiation. It can be employed to determine the level of radiation-induced attenuation produced in Class B single-mode or Class A, category A1 and A2 multimode optical fibres, in either cabled or uncabled form, due to exposure to gamma radiation.

The attenuation of cabled and uncabled optical fibres generally increases when exposed to gamma radiation. This is primarily due to the trapping of radiolytic electrons and holes at defect sites in the glass (i.e. the formation of "colour centres"). This test procedure focuses on two regimes of interest: the low dose rate regime suitable for estimating the effect of environmental background radiation, and the high dose rate regime suitable for estimating the effect of adverse nuclear environments. The testing of the effects of environmental background radiation is achieved with an attenuation measurement approach similar to IEC 60793-1-40 method A, cut-back. The effects of adverse nuclear environments are tested by monitoring the power before, during and after exposure of the test sample to gamma radiation. The depopulation of colour centres by light (photo bleaching) or by heat causes recovery (lessening of radiation induced attenuation). Recovery can occur over a wide range of time which depends on the irradiation time and annealing temperature. This complicates the characterization of radiation induced attenuation since the attenuation depends on many variables including the temperature of the test environment, the configuration of the sample, the total dose and the dose rate applied to the sample and the light level used to measure it.

This test is not a material test for the non-optical material components of a fibre optic cable. If degradation of cable materials exposed to irradiation is studied, other test methods will be used.

This test method is written to contain a clear, concise listing of instructions. The background knowledge that is necessary to perform correct, relevant and expressive irradiation tests as well as to limit measurement uncertainty is presented separately in IEC TR 62283.

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 60793-1-44, *Optical fibres – Part 1-44: Measurement methods and test procedures – Cut-off wavelength*

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

IEC 61280-4-1, *Fibre-optic communication subsystem test procedures – Part 4-1: Installed cable plant – Multimode attenuation measurement*

3 Terms and definitions

No terms and definitions are listed in this document.