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Guidelines for the measurement of high-power damage sensitivity of single-mode fibre to bends – Guidance for the interpretation of results

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

GUIDELINES FOR THE MEASUREMENT OF HIGH-POWER DAMAGE SENSITIVITY OF SINGLE-MODE FIBRE TO BENDS – GUIDANCE FOR THE INTERPRETATION OF RESULTS

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IEC 62547, which is a technical report, has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2009, and constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

– updates related to B6 (bend-insensitive) category single-mode fibres);
– update to analysis for test method 2: Maximum temperature specification.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
86A/1494/DTR	86A/1508/RVC

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

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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

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GUIDELINES FOR THE MEASUREMENT OF HIGH-POWER DAMAGE SENSITIVITY OF SINGLE-MODE FIBRE TO BENDS – GUIDANCE FOR THE INTERPRETATION OF RESULTS

1 Scope

This technical report describes two methods for the measurement of the sensitivity of single-mode optical fibres to high-power damage at bends:

- test method 1 – Failure time characterisation as a function of the launch power and bend conditions (bend angle and bend diameter);
- test method 2 – Equilibrium temperature measurement.

Results from the two methods can only be compared qualitatively.

The results in this report are predominantly on un-cabled and un-buffered fibres. Cabled and buffered fibres are expected to respond differently, because the outer layers can affect the ageing process. Note also that test method 2 testing cannot be applied to buffered or cabled fibres.

These methods do not constitute a routine test to be used in the evaluation of optical fibre.

The parameters derived from the two methods are not intended to be specified within a detailed fibre specification.

The catastrophic failure modes arising and which are described in this document in general occur at bending radii much smaller than specified in the single-mode fibre specification IEC 60793-2-50 or than would be recommended based on mechanical reliability considerations alone.

This report includes several annexes, including a discussion on the rationale for the approaches adopted, metrics for assessment, guidance, examples and some conclusions from initial studies.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60793-1-47, *Optical fibres – Part 1-47: Measurement methods and test procedures – Macrobending loss*

IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification and requirements*

IEC 60825-2, *Safety of laser products – Part 2: Safety of optical fibre communication systems (OFCS)*

IEC 61300-2-14, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-14: Tests – High optical power*

IEC/TR 61292-4, *Optical amplifiers – Part 4: Maximum permissible optical power for the damage-free and safe use of optical amplifiers, including Raman amplifiers*