

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Optical fibres –**

**Part 1-47: Measurement methods and test procedures – Macrobending loss**

**Fibres optiques –**

**Partie 1-47: Méthodes de mesure et procédures d'essai – Pertes par macrocourbures**



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## CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references .....	8
3 Terms and definitions .....	9
4 Apparatus.....	9
4.1 Method A – Fibre winding .....	9
4.2 Method B – Quarter circle bends.....	9
4.3 Input system .....	10
4.3.1 Optical source .....	10
4.3.2 Optical launch arrangement.....	10
4.4 Output system and detection.....	12
4.4.1 Optical divider.....	12
4.4.2 Optical detector.....	12
4.4.3 Optical detection assembly.....	13
4.4.4 Signal processing .....	13
5 Specimen .....	13
5.1 Specimen length .....	13
5.1.1 Method A – Fibre winding .....	13
5.1.2 Method B – Quarter circle bends.....	13
5.2 Specimen end face .....	13
6 Procedure.....	13
6.1 Method A – Fibre winding .....	13
6.1.1 General consideration.....	13
6.1.2 Single-mode fibres.....	14
6.1.3 Multimode (A1) fibres .....	15
6.2 Method B – Quarter circle bends.....	15
7 Calculations.....	17
8 Results .....	17
8.1 Information available with each measurement.....	17
8.2 Information available upon request .....	17
9 Specification information .....	17
Annex A (normative) Change in transmittance by transmitted power technique .....	19
A.1 Apparatus .....	19
A.1.1 General .....	19
A.2 Procedure .....	20
A.3 Calculations.....	20
Annex B (normative) Cut-back technique .....	22
B.1 General.....	22
B.2 Apparatus .....	22
B.2.1 General apparatus for all fibres.....	22
B.3 Procedure .....	22
B.4 Calculations.....	23
Annex C (normative) Requirements for the optical source characteristics for A1 multimode measurement.....	24

C.1	Encircled flux (EF) .....	24
C.2	Limits on encircled flux .....	24
Annex D	(informative) Small bend radius phenomena .....	27
D.1	General.....	27
D.2	Interference between propagating and radiating modes .....	27
D.3	Polarization effects .....	29
D.4	High power damage .....	29
Annex E	(informative) Parallel plate (2-point) macrobend loss approximation.....	30
E.1	General.....	30
E.2	Specimen.....	30
E.3	Apparatus .....	30
E.3.1	General .....	30
E.3.2	Stepper motor control .....	31
E.3.3	Movable plate .....	31
E.3.4	Fixed plate.....	31
E.4	Procedure .....	32
E.5	Calculation.....	32
E.6	Results .....	32
E.7	Comparison of results with normative test.....	33
Bibliography	.....	35
Figure 1	– Quarter circle guide groove in plate.....	9
Figure 2	– General launch arrangement.....	10
Figure 3	– Lens system.....	11
Figure 4	– Launch fibre.....	11
Figure 5	– Mode scrambler (for A4 fibre).....	12
Figure 6	– Multiple bends using stacked plates .....	16
Figure A.1	– Measurement of change in optical transmittance using reference specimen .....	19
Figure A.2	– Measurement of change in optical transmittance using stabilized source .....	20
Figure B.1	– Arrangement of equipment to perform loss measurement at one specified wavelength .....	22
Figure B.2	– Arrangement of equipment used to obtain a loss spectrum .....	22
Figure C.1	– Encircled flux template example .....	25
Figure D.1	– Loss curves versus curve fits.....	28
Figure E.1	– Schematic of possible (two-point bend) apparatus .....	31
Figure E.2	– Example of applying an exponential fit to the spectral data of a B6_a2 fibre .....	33
Figure E.3	– Example of 2-point bend test data for a B6_a2 fibre.....	33
Table 1	– Launch conditions for A2 to A4 fibres .....	12
Table C.1	– Threshold tolerance .....	25
Table C.2	– EF requirements for 50 µm core fibre cabling at 850 nm .....	26
Table C.3	– EF requirements for 50 µm core fibre cabling at 1 300 nm .....	26
Table C.4	– EF requirements for 62,5 µm core fibre cabling at 850 nm .....	26
Table C.5	– EF requirements for 62,5 µm core fibre cabling at 1 300 nm .....	26

Table E.1 – Comparison of parallel plate (2-point) versus method A macrobend loss measurement for a B6\_b3 fibre at 10 mm diameter (ratio of mandrel / 2-point)..... 34

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## OPTICAL FIBRES –

**Part 1-47: Measurement methods and test procedures –  
Macrobending loss**

## FOREWORD

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International Standard IEC 60793-1-47 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 2009. It constitutes a technical revision.

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

- a) former Annex A has been renumbered to Annex D;
- b) introduction of new Annex A on the transmitted power monitoring technique;
- c) introduction of Annex B on the cut-back technique;
- d) introduction of Annex C on the requirements for the optical source characteristics of A1 multimode measurement;
- e) introduction of Annex E on parallel plate (2-point) macrobend loss approximation.

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

FDIS	Report on voting
86A/1823/FDIS	86A/1828/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.

This standard is to be read in conjunction with IEC 60793-1-1:2017.

A list of all parts of 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.

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## INTRODUCTION

Publications in the IEC 60793-1 series concern measurement methods and test procedures as they apply to optical fibres.

Within the same series, several different areas are grouped, but all numbers are possibly not used, as follows:

- |                     |  |
|---------------------|--|
| Parts 1-10 to 1-19: | General  |
| Parts 1-20 to 1-29: | Measurement methods and test procedures for dimensions                               |
| Parts 1-30 to 1-39: | Measurement methods and test procedures for mechanical characteristics               |
| Parts 1-40 to 1-49: | Measurement methods and test procedures for transmission and optical characteristics |
| Parts 1-50 to 1-59: | Measurement methods and test procedures for environmental characteristics            |

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## OPTICAL FIBRES –

### Part 1-47: Measurement methods and test procedures – Macrobending loss

#### 1 Scope

This part of IEC 60793 establishes uniform requirements for measuring the macrobending loss of single-mode fibres (class B) at 1 550 nm or 1 625 nm, category A1 multimode fibres at 850 nm or 1 300 nm, and category A3 and A4 multimode fibres at 650 nm, 850 nm or 1 300 nm, thereby assisting in the inspection of fibres and cables for commercial purposes.

This document gives two methods for measuring macrobending sensitivity:

- Method A – Fibre winding, pertains to class B single-mode fibres and category A1 multimode fibres.
- Method B – Quarter circle bends, pertains to category A3 and A4 multimode fibres.

For both of these methods, the macrobending loss can be measured utilizing general fibre attenuation techniques, for example the power monitoring technique (see Annex A) or the cut-back technique (see Annex B). Methods A and B are expected to produce different results if they are applied to the same fibre. This is because the key difference between the two methods is the deployment, including the bend radius and length of fibre that is bent. The reason for the difference is that A3 and A4 multimode fibres are expected to be deployed in short lengths with a smaller number of bends per unit fiber length compared to single-mode and category A1 multimode fibres.

In this document, the "curvature radius" is defined as the radius of the suitable circular shaped support (e.g. mandrel or guiding groove on a flat surface) on which the fibre can be bent.

In addition, informative Annex E has been added to approximate bend loss for class B single-mode fibres across a broad wavelength range at various effective bends.

#### 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 (all parts), *Optical fibres – Measurement methods and test procedures*

IEC 60793-1-1:2017, *Optical fibres – Part 1-1: Measurement methods and test procedures – General and guidance*

IEC 60793-2, *Optical fibres – Part 2: Product specifications – General*

IEC 60793-2-10, *Optical fibres – Part 2-10: Product specifications – Sectional specification for category A1 multimode fibres*

IEC 61280-1-4, *Fibre optic communication subsystem test procedures – Part 1-4: General communication subsystems – Light source encircled flux measurement method*

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