# IEC 60793-1-47

Edition 4.0 2017-10

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside



## 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**

IEC 60793-1-47:2017-10(en-fr)

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CONTENTS

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# 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- withdrawn,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 |

# 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*