Irish Standard
I.S. EN 61746-1:2011&AC:2014

Calibration of optical time-domain reflectometers (OTDR) -- Part 1: OTDR for single-mode fibres

I.S. EN 61746-1:2011&AC:2014

Incorporating amendments/corrigenda/National Annexes issued since publication:

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CENELEC

Corrigendum to EN 61746-1:2011

English version

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Delete the word "partially" on the title page and in the Foreword.

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September 2014

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61746-1

March 2011

ICS 33.180.01

Supersedes EN 61746:2005 (partially)

English version

Calibration of optical time-domain reflectometers (OTDR) - Part 1: OTDR for single-mode fibres

(IEC 61746-1:2009)

Étalonnage des réflectomètres optiques dans le domaine temporel (OTDR) - Partie 1: OTDR pour fibres unimodales (CEI 61746-1:2009)

Kalibrierung optischer Rückstreumessgeräte (OTDR) - Teil 1: OTDR für Einmodenfasern (IEC 61746-1:2009)

This European Standard was approved by CENELEC on 2011-01-02. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 61746-1:2011 E

Foreword

The text of document 86/347/FDIS, future edition 1 of IEC 61746-1, prepared by IEC TC 86, Fibre optics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61746-1 on 2011-01-02.

This European Standard partially supersedes EN 61746:2005.

The main technical changes to EN 61746:2005 are:

– the adaptation of Clause 4;

– the deletion of Clause 10;

– the adaptation of some definitions and calculations;

– the change of graphical symbology to IEC/TR 61930.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-10-02
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2014-01-02

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 61746-1:2009 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

[2] IEC 60793-1-1	NOTE	Harmonized as EN 60793-1-1.
[3] IEC 60794-1-2:2003	NOTE	Harmonized as EN 60794-1-2:2003 (not modified).
[4] IEC 60825-1	NOTE	Harmonized as EN 60825-1.
[5] IEC 60825-2	NOTE	Harmonized as EN 60825-2.
[6] IEC 61280-1-3:1998	NOTE	Harmonized as EN 61280-1-3:1999 (not modified).
[7] IEC 61300-3-2	NOTE	Harmonized as EN 61300-3-2.
[8] IEC 61300-3-6	NOTE	Harmonized as EN 61300-3-6.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60793-1-40 (mod)	-	Optical fibres - Part 1-40: Measurement methods and test procedures - Attenuation	EN 60793-1-40	-
IEC 60793-2-50	-	Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single-mode fibres	EN 60793-2-50	-
ISO/IEC 17025	-	General requirements for the competence of testing and calibration laboratories	EN ISO/IEC 17025	-
ITU-T Recommendation G.650.1	2004	Definitions and test methods for linear, deterministic attributes of single-mode fibre and cable	-	-
ITU-T Recommendation G.650.2	2002	Definitions and test methods for statistical and non-linear related attributes of single-mode fibre and cable	-	-

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IEC 61746-1

Edition 1.0 2009-12

INTERNATIONAL STANDARD

Calibration of optical time-domain reflectometers (OTDR) – Part 1: OTDR for single mode fibres

IEC 61746-1

Edition 1.0 2009-12

INTERNATIONAL STANDARD

Calibration of optical time-domain reflectometers (OTDR) – Part 1: OTDR for single mode fibres

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

CALIBRATION OF OPTICAL TIME-DOMAIN REFLECTOMETERS (OTDR) –

Part 1: OTDR for single mode fibres

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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9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61746-1 has been prepared by IEC technical committee 86: Fibre optics.

This first edition of IEC 61746-1 cancels and replaces the second edition of IEC 61746, published in 2005. It constitutes a technical revision.

The main technical changes are the adaptation of Clause 4, the suppression of Clause 10, the improvement and the addition of some definitions, the change of some calculations and the change of graphical symbology to IEC/TR 61930.

The text of this standard is based on the following documents:

FDIS	Report on voting
86/347/FDIS	86/362/RVD

Full information on the voting for the approval of this standard 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 maintenance result 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 standard may be issued at a later date.

INTRODUCTION

In order for an Optical time-domain reflectometer (OTDR) to qualify as a candidate for complete calibration using this standard, it must be equipped with the following minimum feature set:

a) a programmable index of refraction, or equivalent parameter;

b) the ability to present a display of a trace representation, with a logarithmic power scale and a linear distance scale;

c) two markers/cursors, which display the loss and distance between any two points on a trace display;

d) the ability to measure absolute distance (location) from the OTDR's zero-distance reference;

e) the ability to measure the displayed power level relative to a reference level (for example, the clipping level);

f) the ability to evaluate the reflectance of a reflective event.

CALIBRATION OF OPTICAL TIME-DOMAIN REFLECTOMETERS (OTDR) –

Part 1: OTDR for single mode fibres

1 Scope

This part of IEC 61746 provides procedures for calibrating single-mode optical time domain reflectometers (OTDR). It only covers OTDR measurement errors and uncertainties.

This standard does not cover correction of the OTDR response.

2 Normative references

The following referenced documents are indispensable for the application 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 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ITU-T Recommendation G.650.1:2002, *Definitions and test methods for linear, deterministic attributes of single-mode fibre and cable*

ITU-T Recommendation G.650.2:2002, *Definitions and test methods for statistical and non-linear attributes of single-mode fibre and cable*

3 Terms, definitions and symbols

For the purposes of this document, the following terms, definitions and symbols apply.

NOTE For more precise definitions, the references to IEC 60050-731 should be consulted.

3.1
attenuation
loss
A
optical power decrease in decibels (dB)

NOTE If P_{in} (watts) is the power entering one end of a segment of fibre and P_{out} (watts) is the power leaving the other end, then the attenuation of the segment is

$$A = 10\log_{10}\left(\frac{P_{\text{in}}}{P_{\text{out}}}\right) \quad \text{dB} \tag{1}$$

[IEV 731-01-48, modified]