SLOVENSKI STANDARD
SIST EN 61280-4-1:2010

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Postopki preskuġanja optiļ nega komunikacijskega podsistema - 4-1. del: Vgrajene ġiļ ne oblike - Meritev slabljenja veļ predstavnosti (IEC 61280-4-1:2009)

Fibre optic communication subsystem test procedures - Part 4-1: Installed cable plant - Multimode attenuation measurement (IEC 61280-4-1:2009)

Prüfverfahren für Lichtwellenleiter-Kommunikationsuntersysteme - Teil 4-1: Lichtwellenleiter-Kabelanlagen - Mehrmoden-Dämpfungsmessungen (IEC 61280-4-1:2009)

Procédures d'essai des sous-systèmes de télécommunication à fibres optiques - Partie 4 -1: Installation câblée - Mesure de l'affaiblissement en multimodal (CEI 61280-4-1:2009)

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33.180.01	Sistemi z optiļ nimi vlakni na sploġno	Fibre optic systems in general

SIST EN 61280-4-1:2010 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

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Fibre optic communication subsystem test procedures - Part 4-1: Installed cable plant - Multimode attenuation measurement

(IEC 61280-4-1:2009)

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This European Standard was approved by CENELEC on 2009-10-01. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 61280-4-1:2009 E

Foreword

The text of document 86C/879/FDIS, future edition 2 of IEC 61280-4-1, prepared by SC 86C, Fibre optic systems and active devices, of IEC TC 86, Fibre optics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61280-4-1 on 2009-10-01.

This European Standard supersedes EN 61280-4-1:2004.

The main changes with respect to EN 61280-4-1:2004 are listed below:

– an additional measurement method based on optical time domain reflectometry (OTDR) is documented, with guidance on best practice in using the OTDR and interpreting OTDR traces;

– the requirement for the sources used to measure multimode fibres is changed from one based on coupled power ratio (CPR) and mandrel requirement to one based on measurements of the near field at the output of the launching test cord;

– highlighting the importance of, and giving guidance on, good measurement practices including cleaning and inspection of connector end faces.

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)	2010-07-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2012-10-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61280-4-1:2009 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:

IEC 60793-1-40	NOTE	Harmonized as EN 60793-1-40:2003 (modified).
IEC 60793-2	NOTE	Harmonized as EN 60793-2:2008 (not modified).
IEC 60793-2-10	NOTE	Harmonized as EN 60793-2-10:2007 (not modified).
IEC 60793-2-50	NOTE	Harmonized as EN 60793-2-50:2008 (not modified).
IEC 61300-3-6	NOTE	Harmonized as EN 61300-3-6:2009 (not modified).

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 60825-2	-[1)]	Safety of laser products - Part 2: Safety of optical fibre communication systems (OFCS)	EN 60825-2	2004[2)]
IEC 61280-1-3	-[3)]	Fibre optic communication subsystem test procedures - Part 1-3: General communication subsystems - Central wavelength and spectral width measurement	EN 61280-1-3	-[3)]
IEC 61280-1-4	-[1)]	Fibre optic communication subsystem test procedures - Part 1-4: General communication subsystems - Light source encircled flux measurement method	EN 61280-1-4	200X[4)]
IEC/PAS 61300-3-35	-[1)]	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-35: Examinations and measurements - Fibre optic cylindrical connector endface visual inspection	-	-
IEC 61315	-[1)]	Calibration of fibre-optic power meters	EN 61315	2006[2)]
IEC 61745	-[1)]	End-face image analysis procedure for the calibration of optical fibre geometry test sets	-	-
IEC 61746	-[1)]	Calibration of optical time-domain reflectometers (OTDR)	EN 61746	2005[2)]

[1)] Undated reference.

[2)] Valid edition at date of issue.

[3)] At draft stage.

[4)] To be ratified.

IEC 61280-4-1

Edition 2.0 2009-06

INTERNATIONAL STANDARD

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

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE XB

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIBRE-OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES –

Part 4-1: Installed cable plant – Multimode attenuation measurement

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 61280-4-1 has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition, published in 2003, and constitutes a technical revision.

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

– An additional measurement method based on optical time domain reflectometry (OTDR) is documented, with guidance on best practice in using the OTDR and interpreting OTDR traces.

– The requirement for the sources used to measure multimode fibres is changed from one based on coupled power ratio (CPR) and mandrel requirement to one based on measurements of the near field at the output of the launching test cord.

– Highlighting the importance of, and giving guidance on, good measurement practices including cleaning and inspection of connector end faces.

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

FDIS	Report on voting
86C/879/FDIS	86C/892/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.

A list of all the parts in the IEC 61280 series, under the general title *Fibre-optic communication subsystem test procedure*, can be found on the IEC website.

For the Part 4, the new subtitle will be *Installed cable plant*. Subtitles of existing standards in this series will be updated at the time of the next edition.

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 publication may be issued at a later date.

FIBRE-OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES –

Part 4-1: Installed cable plant – Multimode attenuation measurement

1 Scope

This part of IEC 61280-4 is applicable to the measurement of attenuation of installed fibre-optic cabling using multimode fibre, typically in lengths of up to 2 000 m. This cabling can include multimode fibres, connectors, adapters and splices.

Cabling design standards such as ISO/IEC 11801, ISO/IEC 24702 and ISO/IEC 24764 contain specifications for this type of cabling. ISO/IEC 14763-3, which supports these design standards, makes reference to the test methods of this standard.

In this standard, the fibre types that are addressed include category A1a (50/125 µm) and A1b (62,5/125 µm) multimode fibres, as specified in IEC 60793-2-10. The attenuation measurements of the other multimode categories can be made, using the approaches of this standard, but the source conditions for the other categories have not been defined.

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

IEC 61280-1-3, *Fibre optic communication subsystem basic test procedures – Part 1-3: Test procedures for general communication subsystems – Central wavelength and spectral width measurement*

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

IEC 61300-3-35, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-35: Examinations and measurements – Fibre optic cylindrical connector endface visual inspection*

IEC 61315, *Calibration of fibre-optic power meters*

IEC 61745, *End-face image analysis procedure for the calibration of optical fibre geometry test sets*

IEC 61746, *Calibration of optical time-domain reflectometers (OTDRs)*

1 A new edition is in preparation.

3 Terms, definitions, graphical symbols and acronyms

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

3.1 Terms and definitions

3.1.1
attenuation
reduction of optical power induced by transmission through a medium such as cabling, given as L (dB)

$$L = 10 \log_{10}(P_{in}/P_{out})$$

where P_{in} and P_{out} are the power, typically measured in mW, into and out of the cabling

3.1.2
light source power meter
LSPM
test system consisting of a light source (LS), power meter (PM) and associated test cords used to measure the attenuation of installed cable plant

3.1.3
optical time domain reflectometer
OTDR
test system consisting of an optical time-domain reflectometer and associated test cords used to characterize and measure the attenuation of installed cable plant and specific elements within that cable plant

3.1.4
test cord
terminated optical fibre cord used to connect the optical source or detector to the cabling, or to provide suitable interfaces to the cabling under test

NOTE There are five types of test cords:

– launch cord: used to connect the light source to the cabling;

– receive cord: used to connect the cabling to the power meter (LSPM only);

– tail cord: attached to the far end of the cabling when an OTDR is used at the near end. This provides a means of evaluating attenuation of the whole of the cabling including the far end connection;

– adapter cord: used to transition between sockets or other incompatible connectors in a required test configuration;

– substitution cord: a test cord used within a reference measurement which is replaced during the measurement of the loss of the cabling under test.

3.1.5
bidirectional measurement
two measurements of the same optical fibre, made by launching light into opposite ends of that fibre

3.1.6
configuration
form or arrangements of parts or elements such as terminations, connections and splices

3.1.7
encircled flux
EF
fraction of cumulative near field power to total output power as a function of radial distance from the optical centre of the core

[from IEC 61280-1-4]

3.1.8
reference grade termination
connector (3.1.9) **plug** (3.1.10) with tightened tolerances terminated onto an optical fibre with tightened tolerances such that the expected loss of a connection formed by mating two such assemblies is less than or equal to 0,1 dB

EXAMPLE: as an example, the core diameter tolerance may need to be ±0,7 micron (ffs). Other fibre tolerances are ffs.

NOTE 1 An adapter (3.1.11), required to assure this performance, may be considered to be part of the reference grade termination where required by the test configuration (3.1.6)

NOTE 2 This definition remains as a point under study. When a more complete definition is available in another document, this definition will be replaced by a reference.

3.1.9
connector
component normally attached to an optical cable or piece of apparatus, for the purpose of providing frequent optical interconnection/disconnection of optical fibres or cables

{Definition 2.6.1 of IEC/TR 61931}

3.1.10
plug
male-type part of a connector

[Definition 2.6.2 of IEC/TR 61931]

3.1.11
adapter
female-part of a connector in which one or two plugs are inserted and aligned

[Definition 2.6.4 of IEC/TR 61931:1998]

3.1.12
socket-style connector
connector for which the adapter, including any alignment device, is integrated with, and permanently attached to the connector plug on one side of the connection

NOTE Examples include the SG and many harsh environment connectors.

3.1.13
reference test method
RTM
test method used in the resolution of a dispute

3.2 Graphical symbols

The following graphic symbols for different connection options have been adapted from IEC 61930.