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INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

Procédures d'essai des sous-systèmes de télécommunication fibroniques – Partie 4-1: Installation câblée – Mesure de l'affaiblissement en multimodal

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CONTENTS

FC	FOREWORD				
1	I Scope				
2	Norm	native references	9		
3 Terms, definitions, graphical symbols and abbreviated terms			9		
	3.1	Terms and definitions	. 10		
	3.2	Graphical symbols	. 12		
	3.3	Abbreviated terms	. 14		
4	Test	methods	. 14		
	4.1	General	. 14		
	4.2	Cabling configurations and applicable test methods	. 15		
5	Over	view of uncertainties	. 17		
	5.1	General	. 17		
	5.2	Sources of significant uncertainties	. 17		
	5.3	Consideration of the PM	. 18		
	5.4	Consideration of test cord connector grade	.18		
	5.5	Typical uncertainty values	. 18		
6	Appa	iratus	. 19		
	6.1	General.	. 19		
	6.2	Light source	. 19		
	6.2.1	Stability	. 19		
	6.2.2	Spectral characteristics (LSPM measurement)	. 19		
	6.3	Launch cord	. 20		
	6.4	Receive or tail cord	.20		
	6.5	Substitution cord	.21		
	6.6	Power meter – LSPM methods only	.21		
	6.7	OIDR apparatus	.21		
	6.8	Connector end face cleaning and inspection equipment	.22		
7	6.9 Drae	Adapters	.22		
1	Proc		. 22		
	7.1	General	.22		
	1.2	Common procedures	.23		
	7.2.1	Care of the test cords	. ∠3		
	7.2.2	Inspect and clean the ends of the optical fibres in the cabling	.23 23		
	7.2.3	Make the measurements	.23		
	725	Make the calculations	.23		
	7.2.6	Duplex and bi-directional testing	.23		
	7.3	Calibration	.23		
	7.4	Safety	.24		
8	Calc	ulations	.24		
9	Docu	Imentation	.24		
	9.1	Information for each test	.24		
	9.2	Information to be available	.24		
Ar	nnex A	(normative) One-cord method	.25		
	A.1	Applicability of test method	.25		

IEC 61280-4-1:2019+AMD1:2021 CSV - 3 - © IEC 2021

A.2	Apparatus	25
A.3	Procedure	25
A.4	Calculation	26
A.5	Components of reported attenuation	26
Annex B (r	normative) Three-cord method	27
B.1	Applicability of test method	27
B.2	Apparatus	27
B.3	Procedure	27
B.4	Calculations	28
B.5	Components of reported attenuation	28
Annex C (I	normative) Two-cord method	29
C.1	Applicability of test method	29
C.2	Apparatus	29
C.3	Procedure	29
C.4	Calculations	30
C.5	Components of reported attenuation	30
Annex D (I	normative) Equipment cord method	32
D.1	Applicability of the test method	32
D.2	Apparatus	32
D.3	Procedure	32
D.4	Calculation	33
D.5	Components of reported attenuation	33
D.6	Typical uncertainty values	34
Annex E (r	normative) Optical time domain reflectometer	35
E.1	Applicability of the test method <u>61280-4-1:2019</u>	35
E.2	Apparatus	35
E.2.1	General	35
E.2.2	OTDR	35
E.2.3	Test cords	35
E.3	Procedure (test method)	36
E.4	Calculation	37
E.4.1	General	37
E.4.2	Connection location	37
E.4.3	Definition of power levels F_1 and F_2	38
E.4.4	Alternative calculation	38
E.5	OTDR uncertainties	40
Annex F (r	normative) Requirements for the source characteristics	42
F.1	Encircled flux	42
F.2	Assumptions and limitations	42
F.3	Encircled flux templates	42
F.3.1	General	42
F.3.2	Uncertainties expectations	43
F.3.3	Templates	43
F.4	Graphical representation of templates	44
Annex G (i	nformative) OTDR configuration information	46
G.1	General	46
G.2	Fundamental parameters that define the operational capability of an OTDR	47
G.2.1	Dynamic range	47
		-

G.2.2	2 Pulse width	47
G.2.3	8 Averaging time	47
G.2.4	Dead zone	47
G.3	Other parameters	47
G.3.1	Index of refraction	47
G.3.2	2 Measurement range	48
G.3.3	B Distance sampling	48
G.4	Other measurement configurations	48
G.4.1	General	48
G.4.2	2 Macrobend or splice attenuation measurement	48
G.4.3	3 Splice attenuation measurement	49
G.4.4	Measurement with high reflection connectors or short length cabling	49
G.4.5	5 Ghost	51
G.5	More on the measurement method	52
G.6	Bi-directional measurement	53
G.7	Non-recommended practices	54
G.7.1	Measurement without tail test cord	54
G.7.2	2 Cursor measurement	
Annex H ((informative) Test cord attenuation verification	55
ц 1	General	55
11.1 LI 2	Apparatus	55
П.Z	Apparatus	
п.э цэ4		
П.З. I	General	55
п.э.2	using non-pinned/unpinned and non-plug/socket style connectors	56
H.3.3	Test cord verification for the one-cord and two-cord methods when	
	using pinned/unpinned or plug/socket style connectors	57
H.3.4	Test cord verification for the three-cord method when using non- pinned/unpinned and non-plug/socket style connectors	59
H.3.5	5 Test cord verification for the three-cord method when using pinned/unpinned or plug/socket style connectors	61
Annex I (r	normative) On the use of reference-grade test cords	
11	General	63
1.1	Practical configurations and assumptions	62
1.2	Component encoifications	03 62
1.2.1		03 64
1.2.2		64
1.2.3	Impact of using reference grade test eards for recommended LCDM methods	04
1.3	Examples for LSDM measurements	04
1.4	Examples for LSPM measurements	05
1.4.1	Example 1 (configuration A, 1-C method – Annex A)	65
1.4.2	Example 2 (configuration D, EC method – Annex D)	65
1.5	the OTDR test method	66
I.5.1	Cabling configurations A, B and C	66
1.5.2	Cabling configuration D	67
Annex J (informative) Launch cord output near-field verification	69
J.1	Direct verification	69
J.2	Test equipment manufacturer verification	69
J.3	Field check with physical artefact	69
J.3.1	General	69

IEC 61280-4 © IEC 2021	-1:2019+AMD1:2021 CSV – 5 –	
J.3.2	Procedure for attenuation characterization of artefacts	71
J.3.3	Construction details	71
J.3.4	Example results	72
Bibliography		76
Figure 1 – C	onnector symbols	13
Figure 2 – S	ymbol for cabling under test	13
Figure 3 – R	eference plane for configuration A tested with the 1-cord method	16
Figure 4 – R	eference plane for configuration B tested with the 3-cord method	16
Figure 5 – R	eference plane for configuration C tested with the 2-cord method	17
Figure 6 – R	eference plane for configuration D tested with the EC method	17
Figure 7 – O	TDR schematic	22
Figure A.1 –	Reference measurement	26
Figure A.2 –	Test measurement	26
Figure B.1 –	Reference measurement	27
Figure B.2 –	Test measurement	28
Figure C.1 –	Reference measurement	29
Figure C.2 –	Test measurement	30
Figure C.3 –	Test measurement for plug-socket style connectors	30
Figure D.1 -	Reference measurement	33
Figure D.2 -	Test measurement	33
Figure E.1 –	OTDR method	36
Figure E.2 –	Location of the ports of the cabling under test	
Figure E.3 –	Graphic construction of F_1 and F_2	
Figure E.4 –	Graphic construction of F_1 , F_{11} , F_{12} and F_2	40
Figure F.1 –	Encircled flux example	45
Figure G.1 -	Splice and macrobend attenuation measurement	49
Figure G.2 -	Attenuation measurement with high reflection connectors	50
Figure G.3 -	Attenuation measurement of a short length cabling	51
Figure G.4 -	OTDR trace with ghost	52
Figure G.5 -	Cursor positioning	53
Figure H.1 –	Obtaining reference power level P ₀	57
Figure H.2 –	Obtaining power level <i>P</i> ₁	57
Figure H.3 –	Obtaining reference power level <i>P</i> ₀	58
Figure H.4 –	Obtaining power level P ₁	58
Figure H.5 –	Obtaining reference power level <i>P</i> ₀	59
Figure H.6 –	Obtaining power level	59
Figure H.7 –	Obtaining reference power level P ₀	60
Figure H.8 –	Obtaining power level P ₁	60
Figure H.9 –	Obtaining power level <i>P</i> ₅	61
Figure H.10	 Obtaining reference power level P₀ 	62

- 6 - IEC 61280-4-1:2019+AMD1:2021 CSV © IEC 2021

Figure H.11 – Obtaining power level P ₁	62
Figure I.1 – Cabling configurations A, B and C tested with the OTDR method	66
Figure I.2 – Cabling configuration D tested with the OTDR method	68
Figure J.1 – Initial power measurement	70
Figure J.2 – Verification of reference-grade connection	70
Figure J.3 – Two offset splices	70
Figure J.4 – Five offset splices	71
Figure J.5 – EF centred	72
Figure J.6 – EF underfilling	73
Figure J.7 – EF overfilling	73
Figure J.8 – L1 attenuation with mandrel	74
Figure J.9 – L1 attenuation with mandrel and mode conditioner	74
Figure J.10 – L2 attenuation with mandrel	74
Figure J.11 – L2 attenuation with mandrel and mode conditioning	75
Figure J.12 – L3 attenuation with mandrel	75
Figure J.13 – L3 attenuation with mandrel and mode conditioning	75
Table 1 – Cabling configurations	15
Table 2 – Test methods and configurations	15
Table 3 – Measurements bias related to test cord connector grade	18
Table 4 – Uncertainty for a given attenuation at 850 nm	19
Table 5 – Spectral requirements IEC. 61280.4.1.2019	19
Table D.1 – Uncertainty for a given attenuation at 850 nm)b/iec-34
Table F.1 – Attenuation, threshold tolerance and confidence level	43
Table F.2 – EF requirements for 50 μm core optical fibre cabling at 850 nm	43
Table F.3 – EF requirements for 50 μ m core optical fibre cabling at 1 300 nm	44
Table F.4 – EF requirements for 62,5 μ m core optical fibre cabling at 850 nm	44
Table F.5 – EF requirements for 62,5 μ m core optical fibre cabling at 1 300 nm	44
Table G.1 – Default effective group index of refraction values	48
Table I.1 – Measurement bias when using reference-grade test cords	65
Table I.2 – Measurement bias when using reference grade test cords – OTDR test method	67

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FIBRE-OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES -

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

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IEC 61280-4-1 edition 3.1 contains the third edition (2019-05) [documents 86C/1575/FDIS and 86C/1592/RVD], its corrigenda 1 (2020-04) and 2 (2022-12), and its amendment 1 (2021-12) [documents 86C/1720/CDV and 86C/1592/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

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 third edition constitutes a technical revision.

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

- a) changes to Annex F on encircled flux to harmonise with IEC TR 62614-2, but keeping the encircled flux limits defined in Tables F.2 to F.5 unchanged;
- b) addition of an equipment cord method in Annex D;
- c) inclusion of testing bend insensitive multimode optical fibre;
- d) updates to measurement uncertainty;
- e) definition of additional cabling configurations;
- f) changes to Table 5 on spectral requirements.

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

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

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under webstore.iec.ch in the data related to the specific publication. At this date, the publication will be

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FIBRE-OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES –

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

1 Scope

This part of IEC 61280 is applicable to the measurement of attenuation of installed optical fibre cabling plant using multimode optical fibre. This cabling plant can include multimode optical fibres, connectors, adapters, splices, and other passive devices. The cabling can be installed in a variety of environments including residential, commercial, industrial, and data centre premises, as well as outside plant environments. The test equipment used in this document has one single fibre connector interface or two single fibre connector interfaces.

In this document, the optical fibres that are addressed include sub-categories A1-OMx, where x = 2, 3, 4 and 5 (50/125 µm) and A1-OM1 (62,5/125 µm) multimode optical fibres, as specified in IEC 60793-2-10. The attenuation measurements of the other multimode categories can be made using the approaches of this document, but the source conditions for the other categories have not been defined.

2 Normative references TANDARD PREVIEW

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.

<u>IEC 01280-4-1:2019</u>

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

IEC 61280-1-3, Fibre optic communication subsystem test procedures – Part 1-3: 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

IEC 61300-3-35, Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-35: Examinations and measurements – Visual inspection of fibre optic connectors and fibre-stub transceivers

IEC 61315, Calibration of fibre-optic power meters

IEC 61746-2, Calibration of optical time-domain reflectometers (OTDR) – Part 2: OTDR for multimode fibres

3 Terms, definitions, graphical symbols and abbreviated terms

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Terms and definitions

3.1.1

attenuation

A

reduction of optical power induced by transmission through a medium such as cabling

$$A = 10 \log(P_{\rm in}/P_{\rm out})$$

where

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

Note 1 to entry: Attenuation is expressed in dB.

3.1.2

light source power meter LSPM

test system consisting of a light source (LS) and power meter (PM) used to measure the attenuation of installed cabling plant

3.1.3

optical time domain reflectometer dards.iteh.ai)

test system consisting of an optical time-domain reflectometer instrument used to characterize and measure the attenuation of installed cabling plant and specific elements within that cabling plant

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Note 1 to entry: This note applies to the French language only. 19

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 1 to entry: 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 attenuation of the cabling under test.

3.1.5

bi-directional 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

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3.1.7 encircled flux EF

fraction of cumulative near-field power to the total output power as a function of radial distance from the optical centre of the core

[SOURCE: IEC 62614:2010, 3.2]

3.1.8

reference-grade termination

connector and plug with tightened tolerances terminated onto an optical fibre with tightened tolerances such that the expected attenuation of a connection formed by mating two such assemblies is lower and more repeatable than a standard-grade termination

Note 1 to entry: An adapter, required to assure the reduced attenuation, may be considered as part of the reference-grade termination where required by the test configuration.

Note 2 to entry: IEC 61755-6-2 defines reference-grade terminations for 50/125 μ m fibre.

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

[SOURCE: IEC TR 61931:1998, 2.6.1, modified – The words in brackets, "optical" and "fibre", have been omitted from the term.]

3.1.10

plug male-type part of a connector

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[SOURCE: IEC TR 61931:1998, 2.6.2] ds/sist/8d283d4d-c512-45d6-9c2a-1debed87870b/iec-

3.1.11

adapter

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

[SOURCE: IEC TR 61931:1998, 2.6.4]

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 1 to entry: Examples include many harsh environment connectors.

3.1.13 reference test method RTM

test method for measuring a given characteristic strictly according to the definition of this characteristic, and giving results which are accurate, reproducible and relatable to practical use

Note 1 to entry: This note applies to the French language only.

[SOURCE: IEC TR 61931:1998, 2.8.1, modified – The words in brackets, "for optical fibres", have been omitted from the term.]