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**Fibre optic communication subsystem test procedures –
Part 4-3: Installed passive optical networks – Attenuation and optical return loss
measurements**

**Procédures d'essai des sous-systèmes de télécommunications fibroniques –
Partie 4-3: Installations de réseau optique passif – Mesures de l'affaiblissement
et de l'affaiblissement de réflexion optique**



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CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	9
2 Normative references	9
3 Terms, definitions, and abbreviated terms	10
3.1 Terms and definitions.....	10
3.2 Abbreviated terms.....	12
4 Basic PON architecture	13
5 Attenuation measurement.....	13
5.1 General.....	13
5.2 Methods.....	14
5.3 Cabling configurations	14
5.4 RTM for attenuation measurement	14
6 Apparatus for attenuation measurement	14
6.1 General.....	14
6.2 Light source	15
6.2.1 Stability	15
6.2.2 Light source spectral characteristics	15
6.3 Launch cord.....	15
6.4 Receive or tail cord.....	15
6.5 Power meter – LSPM method only	16
6.6 OTDR apparatus.....	16
6.6.1 General	16
6.6.2 OTDR spectral characteristics	16
6.7 Connector end face cleaning and inspection equipment	17
7 Overview of uncertainties	17
7.1 General.....	17
7.2 Typical uncertainty values for method A.....	17
7.3 Typical uncertainty values for method B.....	18
8 Optical return loss measurements.....	19
8.1 General.....	19
8.2 ORL measurements using CW	19
8.3 Reflectance measurement using an OTDR.....	19
Annex A (normative) LSPM one-cord reference method.....	20
A.1 Applicability of test method	20
A.2 Apparatus	20
A.3 Procedure	20
A.4 Calculation.....	21
A.5 Components of reported attenuation	21
Annex B (normative) Optical time-domain reflectometer method	22
B.1 Applicability of test method	22
B.2 Apparatus	22
B.2.1 General	22
B.2.2 OTDR	22
B.2.3 Test cords	22
B.3 Procedure (test method)	23

B.4	Calculation of attenuation	24
B.4.1	General	24
B.4.2	Connection location	24
B.4.3	Definition of the power levels F_1 and F_2	25
B.5	Testing launch and tail cords	25
B.5.1	General	25
B.5.2	Launch and tail cords test procedure	26
Annex C (informative)	Filtered optical time-domain reflectometer	27
C.1	General	27
C.2	Applicability of the method	27
C.3	Apparatus	27
C.3.1	FOTDR	27
C.3.2	Test cords	27
C.4	Test method	28
C.5	Calculation of attenuation	28
C.5.1	General	28
C.5.2	Connection location	29
C.5.3	Definition of the power levels F_1 and F_2	29
C.6	Uncertainties	30
C.7	Consideration relative to the measurement of an unused branch of the ODN while at least one branch is active	31
C.7.1	Context	31
C.7.2	Evaluation of the risk of perturbation of the network	31
Annex D (informative)	PON configuration	33
D.1	General	33
D.2	Basic configuration	33
D.3	Coexistence of different PON systems	34
D.4	Wavelength multiplexing	35
Annex E (informative)	Basic uncertainty analysis for methods B and C	37
E.1	General	37
E.2	Uncertainties due to measuring instrument	37
E.3	Uncertainties due to the setup	38
E.4	Uncertainties due to cabling	39
E.5	Relative uncertainty arising from the uncertainty of the OTDR wavelength	39
E.5.1	Impact of the lack of knowledge of the wavelength of the OTDR	39
E.5.2	Impact of using wavelength in the U band	40
E.6	Relative uncertainty arising from non-linearity of the OTDR	41
E.7	Uncertainty arising from OTDR noise	41
E.7.1	General	41
E.7.2	Linear regression	42
E.7.3	Practical determination of uncertainty arising from OTDR noise	44
E.8	Relative uncertainty arising from OTDR cursor placement	47
E.9	Considerations on backscatter coefficient	47
E.10	Sensitivity coefficients	48
E.10.1	General	48
E.10.2	Sensitivity coefficients values	48
E.10.3	Sensitivity for relative uncertainty arising from OTDR noise (tail regression)	49
Annex F (informative)	OTDR configuration information	51

F.1	General.....	51
F.2	Fundamental parameters that define the operational capability of an OTDR.....	52
F.2.1	Dynamic range	52
F.2.2	Dynamic margin.....	52
F.2.3	Pulse width.....	52
F.2.4	Averaging time	52
F.2.5	Dead zone	52
F.2.6	Distance sampling	53
	Bibliography.....	54
	Figure 1 – Single stage conventional ODN structure	13
	Figure 2 – Cabling configuration – Start and end of measured losses in reference test method	14
	Figure 3 – Typical OTDR schematic.....	16
	Figure A.1 – One-cord reference measurement.....	21
	Figure A.2 – One-cord test measurement.....	21
	Figure B.1 – Test measurement for method B	23
	Figure B.2 – Location of the connector ports of the cabling under test	24
	Figure B.3 – Graphic determination of F_1 and F_2	25
	Figure C.1 – Location of the connector ports of the cabling under test	28
	Figure C.2 – Graphic determination of F_1 and F_2	30
	Figure C.3 – OLT structure and signal wavelengths	31
	Figure C.4 – WDM filter response	32
	Figure D.1 – Single stage conventional ODN structure.....	33
	Figure D.2 – Multiple stage conventional ODN structure	34
	Figure D.3 – Implementation of coexistence PON systems.....	34
	Figure D.4 – Single-stage PtP WDM ODN structure	35
	Figure D.5 – Multiple-stage PtP WDM ODN structure.....	36
	Figure D.6 – Example of ODN structure for TWDM	36
	Figure E.1 – Observed PLC splitter wavelength dependency and mathematical model.....	40
	Figure E.2 – Spectral attenuation.....	40
	Figure E.3 – Linear regression location for each measurement method.....	42
	Figure E.4 – Confidence band of the linear regression	43
	Figure E.5 – OTDR trace and noise	44
	Figure E.6 – Noise asymmetry function of DM	46
	Figure E.7 – Measurement validity limits	47
	Figure E.8 – Graphic representation of the amplification of the confidence interval	50
	Table 1 – Light source spectral requirements.....	15
	Table 2 – OTDR spectral requirements	17
	Table 3 – Uncertainty for a given attenuation at 1 310 nm and 1 550 nm using the same photodetector	18
	Table 4 – Uncertainty for a given attenuation at 1 310 nm and 1 550 nm using different photodetectors.....	18
	Table 5 – Uncertainty for a given attenuation at 1 310 nm and 1 550 nm using OTDR.....	19

Table C.1 – Uncertainty for a given attenuation at 1 625 nm and 1 650 nm using OTDR 31

Table E.1 – Uncertainties due to measuring instruments 38

Table E.2 – Uncertainties due to the setup 38

Table E.3 – Uncertainties due to cabling 39

Table E.4 – Difference of attenuation coefficient 41

Table E.5 – Sensitivity coefficients 49

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIBRE OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES –**Part 4-3: Installed passive optical networks –
Attenuation and optical return loss measurements**

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This publication contains an attached file titled "Supplemental Data" in the form of an Excel spread sheet. This file is intended to be used as a complement and does not form an integral part of the standard.

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

Draft	Report on voting
86C/1749A/CDV	86C/1787/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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.

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INTRODUCTION

IEC has developed a large set of standards for measurement of fibre optic cable plants. These standards are applicable to passive optical networks (PONs) if specifics of these networks are known and understood. This document provides dedicated procedures for attenuation measurements in PONs as well as additional information.

For the purpose of this document, a PON is a point-to-multipoint network that includes optical line terminals (OLTs), optical network terminals (ONTs), and an optical fibre infrastructure that is entirely passive and is represented by a single-rooted point-to-multipoint tree of optical fibres with splitters, combiners, filters, and other passive components.

PONs are commonly used in fibre-to-the-home (FTTH) and fibre-to-the-building (FTTB) optical access networks (OAN). In addition, the measurement principles described in this document may also apply to PONs used in other applications, like passive optical local area networks (PO-LANs).

FIBRE OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES –

Part 4-3: Installed passive optical networks – Attenuation and optical return loss measurements

1 Scope

This part of IEC 61280 describes the measurement of attenuation, optical return loss and optical power in installed passive optical networks (PONs) using single-mode fibre.

This document specifies two methods for measuring the attenuation before activation of the PON:

- method A: one-cord method using a light source and a power meter (LSPM);
- method B: optical time-domain reflectometer (OTDR) method in upstream direction only, with reduction of uncertainties due to the variation of backscatter coefficient.

In addition, method C, which is described in informative Annex C, provides an estimate of the attenuation after partial activation of the PON by using a U band filtered optical time-domain reflectometer (FOTDR) in an upstream direction.

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 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

IEC 61280-1-3, *Fibre-optic communication subsystem test procedures – Part 1-3: General communication subsystems – Measurement of central wavelength, spectral width and additional spectral characteristics*

IEC 61280-4-2, *Fibre-optic communication subsystem test procedures – Part 4-2: Installed cable plant – Single-mode attenuation and optical return loss measurement*

IEC TR 61282-14:2019, *Fibre optic communication system design guidelines – Part 14: Determination of the uncertainties of attenuation measurements in fibre plants*

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 61746-1:2009, *Calibration of optical time-domain reflectometers (OTDR) – Part 1: OTDR for single-mode fibres*

IEC 61753-031-2, *Fibre optic interconnecting devices and passive components – Performance standard – Part 031-2: Non-connectorized single-mode 1 × N and 2 × N non-wavelength-selective branching devices for Category C – Controlled environment*