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Fibre optic communication subsystem test procedures – Part 4-4: Cable plants and links – Polarization mode dispersion measurement for installed links

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CONTENTS

FOREWORD 7
INTRODUCTION 9
1 Scope 10
2 Normative references 10
3 Terms, definitions, symbols and abbreviated terms 10
3.1 Terms and definitions 10
3.2 Symbols and abbreviated terms 11
4 Background on PMD properties 12
5 Measurement methods 13
5.1 Methods of measuring PMD 13
5.1.1 General 13
5.1.2 Method A: Fixed analyzer with Fourier transformation (FA-FT) 14
5.1.3 Method B: Stokes parameters evaluation (SPE) 14
5.1.4 Method C: Interferometric 15
5.1.5 Method D: Stokes parameter evaluation using back-reflected light 15
5.1.6 Method E: Modulated phase-shift technique 15
5.1.7 Method F: Polarization phase shift (PPS) 15
5.1.8 Method G: Wavelength scanning OTDR and SOP Analysis (WSOSA) 16
5.2 Document structure 16
5.3 Reference test method 16
6 Measurement configurations 16
6.1 Passive cabling link 16
6.2 Link including amplifiers 17
6.3 Link including chromatic dispersion compensating modules 17
6.3.1 General 17
6.3.2 Grating based DCM 17
6.4 Link including ROADMs 17
6.4.1 General 17
6.4.2 Multi-channel point to point configuration 18
6.4.3 Single channel configuration 18
7 Measurement considerations 18
7.1 General 18
7.2 Wavelength range 18
7.3 PMD measurement range 18
7.4 Measurement dynamic range 19
7.5 Fibre movement 19
7.6 Input and output SOP scrambling 19
7.6.1 General 19
7.6.2 Polarizers/scramblers 19
7.6.3 The 9-states Mueller set 20
7.6.4 Random scrambling 20
7.7 Polarization dependent loss 20
7.8 Amplifier considerations 20
7.8.1 General 20
7.8.2 Optical isolators 20
7.8.3 Wavelength range 20

7.8.4 Power levels 20
7.8.5 Amplified spontaneous emission (ASE) noise 21
7.9 Considerations on location of equipment 21
8 Apparatus 21
8.1 General 21
8.2 Light source and polarizers 21
8.3 Input optics 22
8.4 Cladding mode stripper 22
8.5 High-order mode filter 22
8.6 Output connection 22
8.7 Output optics 23
8.8 Detector 23
8.9 Computer or test platform 23
8.10 Means to reduce the effects of amplified spontaneous emission 23
9 Sampling and specimens 23
10 Procedure 23
11 Calculation or interpretation of results 24
12 Documentation 24
12.1 Information required for each measurement 24
12.2 Information to be available 24
13 Specification information 25
Annex A (normative) Fixed analyzer method 26
A.1 Apparatus 26
A.1.1 Block diagrams 26
A.1.2 Light source 28
A.1.3 Analyzer 29
A.1.4 Optional polarization control at the input and output of the link under test 29
A.2 Procedure 29
A.2.1 Wavelength range and increment 29
A.2.2 Complete the scans 30
A.3 Calculations – Fourier transform 31
A.3.1 General 31
A.3.2 Data pre-processing and Fourier transformation 32
A.3.3 Transform data fitting 32
A.3.4 Spectral range 34
Annex B (normative) Stokes parameter evaluation method 36
B.1 Apparatus 36
B.1.1 Block diagrams 36
B.1.2 Light source 37
B.1.3 Polarimeter 37
B.2 Procedure 37
B.3 Calculations 38
B.3.1 General 38
B.3.2 Jones matrix eigenanalysis (JME) 38
B.3.3 Poincaré sphere analysis (PSA) DGD calculation 40
Annex C (normative) Interferometric method 41
C.1 General 41

C.2 Traditional analysis (TINTY) 42
C.2.1 Apparatus 42
C.2.2 Procedure 43
C.2.3 Calculations 44
C.3 General analysis (GINTY) 45
C.3.1 Benefit 45
C.3.2 Apparatus 45
C.3.3 Procedure 46
C.3.4 Calculations 47
Annex D (informative) Stokes parameter evaluation method using back-reflected light 49
D.1 Utility 49
D.2 Apparatus 49
D.2.1 Block diagram 49
D.2.2 Directional coupler 49
D.2.3 Angled connector 49
D.2.4 Far-end termination 49
D.3 Procedure 50
D.4 Calculation and interpretation of results 50
Annex E (informative) Modulation phase-shift method 51
E.1 Apparatus 51
E.1.1 Overview and block diagrams 51
E.1.2 Light source(s) 52
E.1.3 Modulation 53
E.1.4 Polarization control 54
E.1.5 Input and output optics 54
E.1.6 Optical detector and phase detection electronics 55
E.1.7 Reference signal 55
E.2 Procedure 55
E.2.1 Modulation frequency 55
E.2.2 Scan the wavelengths and measure DGD 55
E.2.3 Calibration 58
E.3 Calculations 58
E.3.1 DGD calculations 58
E.3.2 PMD calculation 59
Annex F (informative) Polarization phase shift method 60
F.1 Apparatus 60
F.1.1 Block diagram 60
F.1.2 Light source 60
F.1.3 Modulation 60
F.1.4 Polarization control 61
F.1.5 Output optics 61
F.1.6 Optical detectors 61
F.1.7 Amplitude and phase comparator 61
F.1.8 Reference signal 62
F.2 Procedure 62
F.2.1 Modulation frequency 62
F.2.2 Wavelength increment 62
F.2.3 Scanning wavelengths and measuring DGDs 62
F.2.4 Calibration 63

F.3 Calculations 63
F.3.1 Results overview 63
F.3.2 DGD determination 64
F.3.3 PMD calculation 65
Annex G (normative) Wavelength scanning OTDR and SOP analysis (WSOSA) PMD test method 66
G.1 General 66
G.2 Apparatus 66
G.2.1 Block diagram 66
G.2.2 Light source 67
G.2.3 Launch polarization 67
G.2.4 Polarization scrambling 68
G.2.5 Input/output optics 68
G.3 Specimen stability 68
G.4 Procedure 68
G.4.1 Set instrument parameters 68
G.4.2 Action of the instrument after measurement initiation 69
G.5 Calculations 71
G.5.1 Power normalisation 71
G.5.2 Transmission differences 72
G.5.3 Mean-square transmission difference and round trip PMD 73
G.5.4 Determination of PMD 74
G.6 Procedures for measuring PMD on installed aerial links 74
G.6.1 Instability compensation 74
G.6.2 Approaches to reducing the effects of instabilities 75
Annex H (informative) PMD determination by Method C 77
H.1 General 77
H.2 Traditional analysis 77
H.3 General analysis 79
Bibliography 81

Figure 1 – Typical passive cabling link configuration 16
Figure 2 – Example configuration of link including amplifiers 17
Figure A.1 – Block diagrams for fixed analyzer 28
Figure A.2 – Example of the R-function for the fixed analyzer method 31
Figure A.3 – A chirped sine wave 33
Figure A.4 – PMD by Fourier analysis 34
Figure B.1 – Block diagram for Method B using a narrowband (tuneable laser) source 36
Figure B.2 – Block diagram for Method B using a broadband (ASE) source 36
Figure C.1 – Generic set-up for Method C (INTY) 41
Figure C.2 – Schematic diagram for Method C (TINTY) 42
Figure C.3 – Typical data obtained by Method C (TINTY) 44
Figure C.4 – Schematic diagram for Method C (GINTY) 45
Figure C.5 – Typical random-mode-coupling data obtained by Method C (GINTY) 47
Figure C.6 – Typical mixed-mode-coupling data obtained by Method C (GINTY) 47
Figure D.1 – Layout for Method D 49
Figure E.1 – Basic apparatus 51

Figure E.2 – Apparatus layout for polarization modulation 52
Figure E.3 – Mueller states on Poincaré sphere 57
Figure E.4 – DGD versus wavelength 58
Figure E.5 – DGD in histogram format 58
Figure F.1 – Block diagram for Method F (polarization phase shift method) 60
Figure F.2 – DGD versus wavelength for a random mode coupling device 64
Figure G.1 – Illustration of the frequency domain and parameters for WSOSA 66
Figure G.2 − Typical generic experimental implementation for WSOSA 67
Figure G.3 – Typical power measurement results 71
Figure G.4 − Typical $s(\omega)$ for random I/O-SOP 72
Figure G.5 − Typical transmission difference for a frequency pair and I/O-SOP 73
Figure G.6 − Example of 2-pulse implementation in presence of instabilities 76

Table E.1 – Example of Mueller set 57

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FIBRE OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES –

Part 4-4: Cable plants and links – Polarization mode dispersion measurement for installed links

FOREWORD

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International Standard IEC 61280-4-4 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 2006. This second edition constitutes a technical revision.

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

a) theory is removed and replaced with a reference to IEC TR 61282-9;
b) a new method, wavelength scanning OTDR and SOP analysis (WSOSA), is added as Annex G;
c) a brief description of each method is added to Clause 5;
d) Methods E and F are converted to informative Annexes E and F;

e) a new Clause (6) on measurement configurations is added;

f) a new Clause (7) on measurement considerations is added;

g) Clause 10 on procedure is expanded;

h) several of the apparatus diagrams are improved;

i) several clarifications about what is measured and what is calculated have been made in Annex H.

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

CDV	Report on voting
86C/1378/CDV	86C/1419/RVC

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.

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 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.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Polarization mode dispersion (PMD) is a statistical parameter. The reproducibility of measurements depends on the particular method, but is limited also by the PMD level of the link and the accessible wavelength range. Gisin [1][1] derived a theoretical limit to this reproducibility independent of the measurement method by assuming ideal measurement conditions.

Originally, the principles of IEC 61280-4-4:2006 were closely aligned with those of IEC 60793-1-48:2003 on optical fibre and optical fibre cable test method, which focuses on aspects related to the measurement of factory lengths. However, IEC 60793-1-48:2007 removed some of the test methods that are no longer of interest to fibre and cable manufacturers. These have been retained as informative Annexes D, E, and F in this document, and a new test method G has been added.

This document also updates test methods A, B and C and adds more information applicable to testing of installed cabling.

NOTE 1 Test methods for factory lengths of optical fibres and optical fibre cables are given in IEC 60793-1-48.

NOTE 2 Test methods for optical amplifiers (OAs) are given in IEC 61290-11-1 and IEC 61290-11-2.

NOTE 3 Test methods for passive optical components are given in IEC 61300-3-32.

NOTE 4 Guidelines for the calculation of PMD for links that include components such as dispersion compensators or optical amplifiers are given in IEC TR 61282-3.

NOTE 5 Further general guidance on PMD measurements and background theory is contained in IEC TR 61282-9.

[1] Figures in square brackets refer to the Bibliography.

FIBRE OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES –

Part 4-4: Cable plants and links – Polarization mode dispersion measurement for installed links

1 Scope

This part of IEC 61280 provides uniform methods of measuring polarization mode dispersion (PMD) of single-mode installed links. An installed link is the optical path between transmitter and receiver, or a portion of that optical path. These measurements can be used to assess the suitability of a given link for high bit rate applications, or to provide insight on the relationships of various related transmission attributes. This document focuses on the measurement methods and requirements for measuring long lengths of installed cabling that can also include other optical elements, such as splices, connectors, amplifiers, chromatic dispersion compensating modules, dense wavelength division multiplexing or multiplexer (DWDM) components, multiplexers, wavelength selective switches, re-configurable optical add drop multiplexer (ROADMS).

This document focuses on the apparatus, procedures, and calculations needed to complete measurements. IEC TR 61282-9 explains the theory behind the test methods.

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 60793-1-44, *Optical fibres – Part 1-44: Measurement methods and test procedures – Cut-off wavelength*

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 TR 61282-9, *Fibre optic communication system design guides – Part 9: Guidance on polarization mode dispersion measurements and theory*

IEC TR 62627-01, *Fibre optic interconnecting devices and passive components – Part 01: Fibre optic connector cleaning methods*