TECHNICAL REPORT

IEC TR 61282-3

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2006-10

Fibre optic communication system design guides –

Part 3:
Calculation of link polarization mode dispersion

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FIBRE OPTIC COMMUNICATION SYSTEM DESIGN GUIDES –

Part 3: Calculation of link polarization mode dispersion

FOREWORD

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IEC 61282-3, which is a technical report, 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 2002. It is a technical revision that includes the following significant changes:

a) the title has been changed to better reflect its applicability to links;
b) Equations (1) and (2) were simplified in order to align with agreements in the ITU-T.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
86C/701/DTR	86C/720/RVC

Full information on the voting for the approval of this technical report 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 parts of the IEC 61282 series, published under the general title *Fibre optic communication system design guides,* can be found on the IEC website.

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- withdrawn,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.

INTRODUCTION

Polarization mode dispersion (PMD) is usually described in terms of a differential group delay (DGD), which is the time difference between the principal states of polarization of an optical signal at a particular wavelength and time. PMD in cabled fibres and optical components causes an optical pulse to spread in the time domain, which may impair the performance of a fibre optic telecommunication system, as defined in IEC 61281-1.

FIBRE OPTIC COMMUNICATION SYSTEM DESIGN GUIDES –

Part 3: Calculation of link polarization mode dispersion

1 Scope

This part of IEC 61282 provides guidelines for the calculation of polarization mode dispersion (*PMD*) in fibre optic systems to accommodate the statistical variation of *PMD* and differential group delay (*DGD*) in optical fibre cables and components.

This technical report describes methods for calculating *PMD* due to optical fibre cables and optical components in an optical link. The calculations are compatible with those documented in the outdoor optical fibre cable specification IEC 60794-3. Example calculations are given to illustrate the methods for calculating total optical link *PMD* from typical cable and optical component data. The calculations include the statistics of concatenating individual optical fibre cables drawn from a specified distribution. The calculations assume that all components have *PMD* equal to the maximum specified value.

The calculations described cover first order *PMD* only. The following subject areas are currently beyond the scope of this technical report, but remain under study:

– calculation of second and higher order *PMD*;

– accommodation of components with polarization dependent loss (PDL) – if it is assumed that PDL is negligible in optical fibre cables;

– system impairments (power penalty) due to *PMD*;

– interaction with chromatic dispersion and other nonlinear effects.

Measurement of *PMD* is beyond the scope of this technical report. Methods of measurement of *PMD* of optical fibre and cable are given in IEC 60793-1-48. The measurement of optical amplifier *PMD* is in IEC 61290-11-1. The measurement of component *PMD* is in IEC 61300-3-32. Measurement of link *PMD* is given in 61280-4-4. A general theory and guidance on measurements is given in 61282-9.