# IEC TR 61282-5

Edition 2.0 2019-07

# TECHNICAL REPORT

## Fibre optic communication system design guidelines – Part 5: Accommodation and compensation of chromatic dispersion

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 33.180.01

ISBN 978-2-8322-7131-5

# CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

# FIBRE OPTIC COMMUNICATION SYSTEM DESIGN GUIDELINES –

## Part 5: Accommodation and compensation of chromatic dispersion

## 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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a Technical Report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 61282-5, 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, and constitutes a technical revision.

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

a) extends the application space for dispersion compensation and accommodation to communication systems that employ non-zero dispersion-shifted fibres;
b) adds a discussion on the suitability of fibre types for long-haul transmission of wavelength-multiplexed signals;
c) updates the dispersion coefficient limits for dispersion-unshifted fibres;

d) adds information on the dispersion coefficients of dispersion-shifted fibres;

e) updates the naming of the fibre types to the revised naming conventions defined in IEC 60793-2-50:2018;

f) updates Table 2 to include the dispersion tolerance of phase-shift-keyed modulation formats used for the transmission of 40 Gbit/s and 100 Gbit/s signals;

g) adds information on dispersion management in terrestrial and submarine communication systems;

h) extends the description of passive dispersion compensators based on fibre Bragg gratings and etalons;

i) adds information on electronic dispersion accommodation in coherent communication systems (including transmitters and receivers);

j) updates the description of optical accommodation techniques to include soliton transmission and mid-span spectral inversion;

k) extends the list of system parameters for passive dispersion compensators to include wavelength-dependent loss, phase ripple, and latency;

l) updates the description of dispersion compensator applications in long-haul communication systems.

The text of this Technical Report is based on the following documents:

| Draft TR | Report on voting |
|---|---|
| 86C/1573/DTR | 86C/1581/RVDTR |

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 in the IEC 61282 series, published under the general title *Fibre optic communication system design guidelines*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles 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 document will remain unchanged until the stability date indicated on the IEC web site 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.

# FIBRE OPTIC COMMUNICATION SYSTEM DESIGN GUIDELINES –

# Part 5: Accommodation and compensation of chromatic dispersion

## 1 Scope

This part of IEC 61282, which is a Technical Report, describes various techniques for accommodation and compensation of chromatic dispersion in fibre optic communication systems. These techniques include dispersion compensation with passive optical components, advanced dispersion management, and electronic accommodation of dispersion in the transmitters and receivers.

## 2 Normative references

There are no normative references in this document.