



SLOVENSKI STANDARD
SIST EN 61978-1:2002

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Fibre optic passive dispersion compensators - Part 1: Generic specification (IEC 61978-1:2000)

Fibre optic passive dispersion compensators -- Part 1: Generic specification

Passive Lichtwellenleiter-Dispersionskompensatoren -- Teil 1: Fachgrundspezifikation

Compensateurs de dispersion passifs à fibres optiques -- Partie 1: Spécification générique

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ICS:

33.180.20 Ú[ç^: [çæ) ^Á æ |æ^Á æ Fibre optic interconnecting devices
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EUROPEAN STANDARD

EN 61978-1

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January 2001

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English version

Fibre optic passive dispersion compensators
Part 1: Generic specification
(IEC 61978-1:2000)

Compensateurs de dispersion passifs à
fibres optiques
Partie 1: Spécification générique
(CEI 61978-1:2000)

Passive Lichtwellenleiter-
Dispersionskompensatoren
Teil 1: Fachgrundspezifikation
(IEC 61978-1:2000)

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This European Standard was approved by CENELEC on 2000-11-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 86B/1337/FDIS, future edition 1 of IEC 61978-1, prepared by SC 86B, Fibre optic interconnecting devices and passive components, of IEC TC 86, Fibre optics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61978-1 on 2000-11-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2001-08-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-11-01

Annexes designated "normative" are part of the body of the standard. In this standard, annex ZA is normative. Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61978-1:2000 was approved by CENELEC as a European Standard without any modification.

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INTRODUCTION

This part of IEC 61978, which is a generic specification, is divided into three clauses.

Clause 1 is entitled "General" and contains general information pertaining to this generic specification.

Clause 2 is entitled "Requirements" and contains all the requirements which shall be met by passive dispersion compensators covered by this standard, i.e. requirements for classification, the IEC specification system, documentation, materials, workmanship, quality, performance, identification, and packaging.

Clause 3 is entitled "Quality assessment procedures" and contains all of the procedures which need to be followed for proper quality assessment of products covered by this standard.

NOTE Test and measurement procedures are described in IEC 61300-1, IEC 61300-2 and IEC 61300-3.

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FIBRE OPTIC PASSIVE DISPERSION COMPENSATORS –

Part 1: Generic specification

1 General

1.1 Scope

This part of IEC 61978 applies to fibre optic passive dispersion compensators, all exhibiting the following features:

- they are optically passive;
- they have optical ports for transmitting optical power;
- the ports are optical fibres or optical fibre connectors;
- they are wavelength sensitive;
- they may be polarization sensitive.

This standard establishes uniform requirements for the following points:

- passive dispersion compensator requirements;
- quality assessment procedures.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61978. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 61978 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC QC 001001:1998, *IEC Quality Assessment System for Electronic Components (IECQ) – Basic Rules*

IEC QC 001002-2:1998, *IEC Quality Assessment System for Electronic Components (IECQ) – Rules of Procedure – Part 2: Documentation*

IEC QC 001002-3:1998, *IEC Quality Assessment System for Electronic Components (IECQ) – Rules of Procedure – Part 3: Approval procedures*

IEC 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60050(731):1991, *International Electrotechnical Vocabulary (IEV) – Chapter 731: Optical fibre communication*

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*

IEC 60617 (all parts), *Graphical symbols for diagrams*

IEC 60695-2-2:1991, *Fire hazard testing – Part 2: Test methods – Section 2: Needle-flame test*

IEC 60825 (all parts), *Safety of laser products*

IEC 61300-1:1995, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 1: General and guidance*

IEC 61300-2 (all parts), *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2: Tests*

IEC 61300-3 (all parts), *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3: Examinations and measurements*

IEC/TR3 61930:1998, *Fibre optic graphical symbology*

IEC Guide 102:1996, *Electronic components – Specification structures for quality assessment (Qualification approval and capability approval)*

ISO 129:1985, *Technical drawings – Dimensioning – General principles, definitions, methods of execution and special indications*

ISO 286-1:1988, *ISO system of limits and fits – Part 1: Bases of tolerances, deviations and fits*

ISO 370:1975, *Toleranced dimensions – Conversion from inches into millimetres and vice versa*

ISO 1101:1983, *Technical drawings – Geometrical tolerancing – Tolerancing of form, orientation, location and run-out – Generalities, definitions, symbols, indications on drawings*

ISO 8601:1988, *Data elements and interchange formats – Information interchange – Representation of dates and times*

1.3 Definitions

For the purpose of this part of IEC 61978, the definitions given in IEC 60050(731) as well as the following definitions apply:

1.3.1

passive dispersion compensator (PDC)

two-port in-line passive component possessing chromatic dispersion. PDCs are commonly used to add negative dispersion to compensate for the positive dispersion of an optical path

1.3.2

group delay

time by which a pulse is delayed by an optical element. The group delay generally varies with the operating wavelength

1.3.3

(chromatic) dispersion

derivative of group delay with respect to wavelength. A typical unit is ps/nm. The dispersion generally varies with the operating wavelength

1.3.4**dispersion slope**

derivative of chromatic dispersion with respect to wavelength. A typical unit is ps/nm². The dispersion slope generally varies with the operating wavelength

1.3.5**operating wavelength**

nominal wavelength λ at which a passive component operates with the specified performance

1.3.6**operating wavelength range****bandpass**

specified range of wavelengths from λ_{\min} to λ_{\max} about an operating wavelength λ , within which a passive component operates with the specified performance

1.3.7**figure of merit (FoM)**

ratio of the dispersion to the attenuation of a PDC at a particular operating wavelength

1.3.8**attenuation spectral ripple**

maximum peak-to-peak variation of attenuation in the band-pass

1.3.9**dispersion spectral ripple**

maximum peak-to-peak variation of dispersion in the band-pass

1.3.10**attenuation**

reduction in optical power between an input and output port of a passive component expressed in decibels. It is defined as follows:

$$a = -10 \log \frac{P_a}{P_0}$$

where

P_0 is the optical power launched into the input port;

P_a is the optical power received from the output port.

1.3.11**return loss**

fraction of input power that is returned from the input port of a passive component expressed in decibels. It is defined as follows:

$$RL = -10 \log \frac{P_r}{P_0}$$

where

P_0 is the optical power launched into the input port;

P_r is the optical power received back from the same port.

1.3.12**reflectance**

negative of the return loss

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1.3.13**polarization-dependent loss**

maximum fluctuation for any state of polarization

1.3.14**polarization-mode dispersion (PMD)**

the maximum differential group delay for all polarization states passing through the component

2 Requirements

The requirements for passive dispersion compensators covered by this clause are intended to aid in classifying this device in a relevant specification. The common requirements for fibre optic enclosures covered by this specification are specified in this clause. Additional or more severe requirements may be imposed by the relevant blank detail specification and by the detail specification.

2.1 Classification

PDCs shall be classified by the following categories. The evolution of fibre optic technology and technical progress may alter or add items.

- Type.
- Style.
- Variant.
- Environmental category.
- Assessment level.
- Normative reference extensions.

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2.1.1 Type

Passive dispersion compensators are divided into types by their main characteristics as follows:

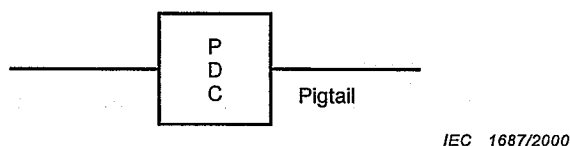
- fixed and tuneable;
- transmissive;
- bidirectional or unidirectional;
- any combination of the above;
- active temperature control or passively compensated.

2.1.2 Style

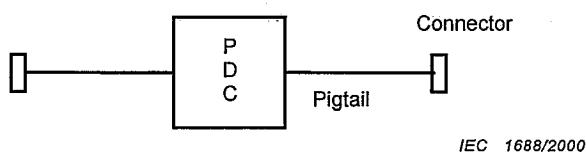
Passive dispersion compensators may be classified into styles based on the fibre type(s), the connector type(s), cable type(s), housing shape, temperature control and the configuration. Style is not intended to define material or design. The configurations of branching device ports are classified as follows.

2.1.2.1 Configuration A

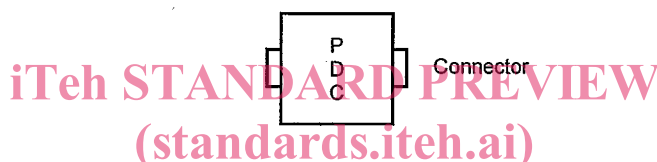
A device containing integral fibre optic pigtails, without connectors:

**2.1.2.2 Configuration B**

A device containing integral fibre optic pigtails, with a connector on each pigtail:

**2.1.2.3 Configuration C**

A device containing fibre optic connectors as an integral part of the device housing:

**2.1.2.4 Configuration D**

A device containing some combination of the interfacing features of the preceding configurations.

2.1.3 Variant

The PDC variant identifies those common features which encompass structurally similar components (see 3.2).

Examples of features which define a variant include, but are not limited to, the following:

- orientation of ports;
- means of mounting.

2.1.4 Environmental category

Various environmental categories are given in the blank detail specifications associated with this standard, which define the test sequences needed for quality assurance.

Detail specification writers may add tests and/or groups of tests to a particular environmental category. However, the detail specification writer shall not remove tests nor alter the sequence of an environmental category standard. When a detail specification writer adds tests to a specified category, the environmental category shall be given a plus (+) designation.