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**Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-12: Examinations and measurements - Polarization dependence of attenuation of a single-mode fibre optic component: Matrix calculation method (IEC 61300-3-12:1997)**

Fibre optic interconnecting devices and passive components - Basic test and measurement procedures -- Part 3-12: Examinations and measurements - Polarization dependence of attenuation of a single-mode fibre optic component: Matrix calculation method

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Lichtwellenleiter - Verbindungselemente und passive Bauteile - Grundlegende Prüf- und Meßverfahren -- Teil 3-12: Untersuchungen und Messungen - Polarisationsabhängigkeit der Dämpfung bei einem Einmoden-Lichtwellenleiter-Bauteil: Matrizenberechnung

Dispositifs d'interconnexion et composants passifs à fibres optiques - Méthodes fondamentales d'essais et de mesures -- Partie 3-12: Examens et mesures - Sensibilité à la polarisation de l'affaiblissement d'un composant à fibres optiques monomodes: Méthode de calcul matriciel

**Ta slovenski standard je istoveten z: EN 61300-3-12:1997**

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**ICS:**

33.180.20	Povezovalne naprave za optična vlakna	Fibre optic interconnecting devices
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**SIST EN 61300-3-12:1997****en**

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English version

**Fibre optic interconnecting devices and passive components  
Basic test and measurement procedures  
Part 3-12: Examinations and measurements - Polarization dependence  
of attenuation of a single-mode fibre optic component:  
Matrix calculation method  
(IEC 61300-3-12:1997)**

Dispositifs d'interconnexion et  
composants passifs à fibres optiques  
Méthodes fondamentales d'essais et  
de mesures  
Partie 3-12: Examens et mesures  
Sensibilité à la polarisation de  
l'affaiblissement d'un composant à  
fibres optiques monomodes:  
Méthode de calcul matriciel  
(CEI 61300-3-12:1997)

Lichtwellenleiter - Verbindungselemente  
und passive Bauteile - Grundlegende  
Prüf- und Meßverfahren  
Teil 3-12: Untersuchungen und  
Messungen - Dämpfung in Abhängigkeit  
der Polarisation bei einem  
Einmoden-Lichtwellenleiter-Bauteil:  
Matritzenberechnung  
(IEC 61300-3-12:1997)

This European Standard was approved by CENELEC on 1997-03-11. 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.

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.

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## 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/842/FDIS, future edition 1 of IEC 61300-3-12, 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 61300-3-12 on 1997-03-11.

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) 1997-12-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 1997-12-01

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.

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### Endorsement notice

The text of the International Standard IEC 61300-3-12:1997 was approved by CENELEC as a European Standard without any modification.

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**Annex ZA (normative)**

**Normative references to international publications  
with their corresponding European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 1300-3-2	1995	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures Part 3-2: Examinations and measurements Polarization dependence of a single-mode fibre optic device	-	-

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**NORME  
INTERNATIONALE  
INTERNATIONAL  
STANDARD**

**CEI  
IEC**

**61300-3-12**

Première édition  
First edition  
1997-03

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**Dispositifs d'interconnexion et composants  
passifs à fibres optiques – Méthodes  
fondamentales d'essais et de mesures –**

**Partie 3-12:  
Examens et mesures –  
Sensibilité à la polarisation de l'affaiblissement  
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**Fibre optic interconnecting devices  
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and measurement procedures –**

**Part 3-12:  
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Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**FIBRE OPTIC INTERCONNECTING DEVICES AND  
PASSIVE COMPONENTS –  
BASIC TEST AND MEASUREMENT PROCEDURES –**

**Part 3-12: Examinations and measurements – Polarization dependence  
of attenuation of a single-mode fibre  
optic component: Matrix calculation method**

## FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61300-3-12 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

The text of this standard is based on the following documents:

FDIS	Report on voting
86B/842/FDIS	86B/943/RVD

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

IEC 1300 consists of the following parts, under the general title *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures*:

- Part 1: General and guidance
- Part 2: Tests
- Part 3: Examinations and measurements



# FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – BASIC TEST AND MEASUREMENT PROCEDURES –

## Part 3-12: Examinations and measurements – Polarization dependence of attenuation of a single-mode fibre optic component: Matrix calculation method

### 1 General

#### 1.1 Scope and object

This part of IEC 1300 describes the test to determine the dependence of attenuation of single-mode fibre optic components to changes in the state of the polarization of the input light. The value given by this test is the maximum variation in loss over all states of polarization of the launch light into the component under test (DUT).

#### 1.2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of IEC 1300. At the time of publication, the edition indicated was valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 1300 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 1300-3-2: 1995, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-2: Examinations and measurements – Polarization dependence of a single-mode fibre optic device*

### 2 General description

This test differs from the methods described in IEC 1300-3-2 and it constitutes an alternative method. These other test procedures are based on manipulation of the state of polarization of light either continuously or in small incremental adjustments in order to measure maxima and minima of the attenuation of transmitted light. This test method involves the measurement of the behaviour of a DUT when illuminated by a small set of well-defined states of polarization of input light. These measurements are followed by a matrix calculation to determine the polarization dependence of loss (PDL) of the DUT.

This procedure can be applied to any single-mode passive component. It determines the total range of attenuation due to changes in polarization of the launch light.

Generally, there are two matrix formalisms to describe and quantify the polarization behaviour of light in fibre optic systems, that based on the Mueller matrix and that based on the Jones matrix.

The Mueller matrix formalism entails an optical power representation of the performance of components. This matrix is a square 16 element matrix. Here, the state of polarization of light is described as a 4 element Stokes vector. The Stokes vector of the incident light multiplied by the Mueller matrix of the DUT gives the Stokes vector of the output light, and this output light may be from transmission, reflection or scattering. In the determination of PDL of a component using Mueller matrices, it is normally not necessary to determine the full Mueller matrix but rather only the first row of the matrix, which provides complete information on light intensity but not on the resultant state of polarization.