

INTERNATIONAL STANDARD

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Second edition
2003-06

Fibre optic interconnecting devices and passive components – Basic test and measurement procedures –

Part 1: General and guidance

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

*Partie 1:
Généralités et guide*



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WITHDRAWN

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 1: General and guidance

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.
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International Standard IEC 61300-1 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 1995. It constitutes a technical revision.

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

FDIS	Report on voting
86B/1849/FDIS	86B/1877/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.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

IEC 61300 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

The committee has decided that the contents of this publication will remain unchanged until 2008. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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

Withdawn

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INTRODUCTION

The publications of the IEC 61300 series contain fundamental information on environmental testing procedures and measurement procedures relating to fibre optic interconnecting devices and passive components. They are intended to be used to achieve uniformity and reproducibility in environmental testing procedures and measurement procedures.

The term "test procedure" refers to procedures commonly known as environmental tests. The expressions "environmental conditioning" and "environmental testing" refer to the environments to which components or equipment may be exposed so that an assessment may be made of their performance under the conditions of use, transport and storage.

The term "measurement procedure" refers to those measurements which are necessary to assess the physical and optical characteristics of a component and may also be used before, during or after a test procedure to measure the effects of environmental conditioning or testing. The return loss and attenuation tests are examples of measurement procedures.

The requirements for the performance of components or equipment subjected to the test and measurement procedures described in this standard are not included. The relevant specification for the device under test defines the allowed performance limits.

When drafting a specification or purchase contract, only those tests should be specified which are necessary for the relevant components or equipment taking into account the technical and economic aspects.

The environmental test procedures are contained in the IEC 61300-2 series and the measurement procedures in the IEC 61300-3 series. Each test or measurement procedure is published as a stand-alone publication so that it may be modified, expanded or cancelled without having an effect on any other test or measurement procedure. However, it should be noted that, where practical, reference is made to other standards as opposed to repeating all or part of already existing standards. As an example, the cold test for fibre optic apparatus refers to IEC 60068-2-1, but it also provides other needed information such as purpose, recommended severities and a list of items to be specified.

Multiple methods may be contained in a test or measurement procedure. As an example, several methods of measuring attenuation are contained in the attenuation measurement procedure.

If more than one method is contained in a test or measurement procedure, the reference method is identified.

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

Part 1: General and guidance

1 Scope

This part of IEC 61300 contains a series of environmental test and measurement procedures and, in some cases, preferred severities designed to assess the ability of fibre optic interconnecting devices and passive components to perform under expected service conditions. Although the severities are primarily intended for land-based communications, the procedures may be used for other applications.

The object of this standard is to provide uniform and reproducible environmental test procedures and measurement procedures, for those preparing specifications for fibre optic interconnecting devices and passive components.

These test and measurement procedures are based on available international engineering experience and judgement, and are designed to provide information on the following properties of components and equipment, such as connectors, splices, switches, attenuators, etc.:

- a) ability to operate within specified limits of temperature, pressure, humidity, mechanical stress or other environmental conditions and certain combinations of these conditions;
- b) ability to withstand storage and transport;
- c) ability to meet the specified levels of optical performance.

The tests in this standard permit the performance of sample components or equipment to be compared. To assess the overall quality of a production lot, the test procedures should be applied in accordance with a suitable sampling plan and may be supplemented by appropriate additional tests, if necessary.

To provide tests appropriate to the different intensities of an environmental condition, some of the test procedures have a number of degrees of severity. These different degrees of severity are obtained by varying the time, temperature or some other determining factor separately or in combination.

This standard should be used in combination with the relevant specification which will define the tests to be used, the required degree of severity for each of them, their sequence, if relevant, and the permissible performance limits. In the event of conflict between this basic standard and the relevant specification, the latter will take precedence.

2 Normative references

The following referenced documents are indispensable for the application 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 60050-731, *International Electrotechnical Vocabulary – Chapter 731: Optical fibre communication*

IEC 60068-2-1 *Environmental testing – Part 2: Tests – Tests A: Cold*

IEC 60617 [DB-2002]¹, *Graphical symbols for diagrams*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification, requirements and user's guide*

IEC 60825-2, *Safety of laser products – Part 2: Safety of optical fibre communication systems*

IEC 61300-3-1, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-1: Examinations and measurements – Visual examination*

IEC 61315, *Calibration of fibre optic power meters*

ISO 4288, *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Rules and procedures for the assessment of surface texture*

3 Terms and definitions

For the purposes of this part of IEC 61300, the following definitions apply.

3.1 test

complete series of steps designed to subject specimens to an environmental condition or series of conditions and which normally consists of the following:

- a) pre-conditioning (where required);
- b) initial examination and measurements (where required);
- c) conditioning;
- d) recovery (where required);
- e) final examination and measurement

3.2 pre-conditioning

treatment of a specimen with the object of removing or partly counteracting the effects of its previous history

NOTE When called for, it is the first process in the test procedure

3.3 conditioning

exposure of a specimen to environmental conditions in order to determine the effects of such conditions on the specimen

NOTE Where measurements are required during conditioning this will be stated in the relevant specification

3.4 recovery

treatment of a specimen after conditioning in order that the properties of the specimen may stabilize before measurement

3.5 specimen

single component, equipment or other item designated to be tested in accordance with the procedures of this standard

NOTE In some cases this is referred to as "device under test" or "DUT".

¹ "DB" refers to the IEC online database

3.6

sample

group of specimens, selected at random or by some other specified procedure from a larger population and which, for the purpose of testing, is intended to be representative of the larger population

4 Standard atmospheric conditions

Standard atmospheric conditions need to be controlled within some range to ensure proper correlation of data obtained from measurements and tests conducted in various facilities. Test and measurement procedures shall be conducted under the following atmospheric conditions unless otherwise specified. In some cases special ambient conditions may be needed and can be specified in the relevant specification.

The standard range of atmospheric conditions for carrying out measurements and tests is as follows:

Temperature	Relative humidity	Air pressure
18 °C to 28 °C	25 % to 75 %	86 kPa to 106 kPa (860 mbar to 1 060 mbar)

Variations in ambient temperature and humidity shall be kept to a minimum during a series of measurements.

5 Significance of the numerical value of a quantity

The numerical values of quantities for the various parameters (temperature, humidity, stress, duration, optical power levels, etc.) given in the basic methods of environmental and optical testing constituting the IEC 61300-2 series and the optical and physical measurements constituting the IEC 61300-3 series are expressed in different ways according to the needs of each individual test.

The two cases that most frequently arise are:

- the quantity is expressed as a nominal value with a tolerance;
- the quantity is expressed as a range of values.

For these two cases, the significance of the numerical value is discussed below.

5.1 Quantity expressed as nominal value with tolerance

Examples of two forms of presentation:

- 40 mm ± 2 mm
2 s ± 0,5 s
0,3 dB ± 0,1 dB
- 93% $\begin{matrix} +3 \\ -2 \end{matrix}$ %

The expression of a quantity as a numerical value indicates the intention that the test should be carried out at the stated value. The object of stating tolerances is to take account of, in particular, the following factors:

- the difficulties in regulating some devices and of their drift (undesired slow variation) during the test;
- instrument errors;