

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

Part 2-14: Tests — Optical power handling and damage threshold characterization

The European Standard EN 61300-2-14:2006 has the status of a British Standard

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National foreword

This British Standard is the official English language version of EN 61300-2-14:2006. It is identical with IEC 61300-2-14:2005. It supersedes BS EN 61300-2-14:1997 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee GEL/86, Fibre optics, to Subcommittee GEL/86/2. Interconnecting devices and passive components, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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Summary of pages

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**Fibre optic interconnecting devices and passive components -
Basic test and measurement procedures
Part 2-14: Tests - Optical power handling and
damage threshold characterization
(IEC 61300-2-14:2005)**

Dispositifs d'interconnexion et composants
passifs à fibres optiques - Méthodes
fondamentales d'essais
et de mesures
Partie 2-14: Essais -
Traitement de la puissance optique et
caractérisation du seuil de dommage
(CEI 61300-2-14:2005)

Lichtwellenleiter -
Verbindungselemente und passive
Bauteile
Teil 2-14: Prüfungen -
Ermittlung von Kennwerten
der optischen Leistung
(IEC 61300-2-14:2005)

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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.

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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/2204/FDIS, future edition 2 of IEC 61300-2-14, 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 61300-2-14 on 2006-03-01.

This European Standard supersedes EN 61300-2-14:1997.

Specific technical changes from EN 61300-2-14:1997 include a fundamental change of the measurement method to introduce various measurement environments such as limited testing resources.

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) | 2006-12-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2009-03-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61300-2-14:2005 was approved by CENELEC as a European Standard without any modification.

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

Part 2-14: Tests – Optical power handling and damage threshold characterization

1 Scope

The purpose of this part of IEC 61300 is to characterize the robustness of a fibre optic passive component or interconnecting device against damage from exposure to optical power.

Specifically, the objectives are to:

- characterize both the short term and the long term robustness of components from damage due to optical power induced degradation or failure mechanisms;
- provide data necessary to ensure that components are exposed to appropriate optical power levels that will not degrade their performance;
- identify components prone to irreversible degradation.

The test procedure described in this standard is structured such that, if the ‘full characterization’ option is performed, the component will be characterized without the need for re-testing should future applications change.

For example, one way to approach the issue of optical power characterization is to test a component at a specific power level and wavelength to which the component will be exposed in a specific application. While testing of the component at that power/wavelength may indicate the robustness of the component in that specific application, if the component is considered for another application, the tests will need to be performed again at other powers/wavelengths. However, if the component is fully characterized at all relevant wavelengths, and the maximum power handling level at those wavelengths is identified, then all the information required to assess the suitability of the component in any application is available.

The results of the full characterization test method in this standard will be a rating of the component under test. This rating forms the basis of determining the power levels to which the component can be exposed in a reliable manner. It essentially defines the “operating region envelope” for the component.

Since there will often be constraints (that is, time, cost, equipment availability) that limit the ability to perform the full characterization, alternative test methods are outlined in this standard that perform only a subset of the full test.

The test methods contained in this standard are intended to assess the robustness of components in their normal use conditions for which they were designed.

2 Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

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

3 Definitions

3.1

drift

P_{drift}

the power at which the device experiences a specified change in insertion loss (IL) of 0,5 dB during the short term test while under power. This drift is recoverable after power is removed from the component

3.2

failure

P_{fail}

the power at which the device experiences a permanent specified change in insertion loss (IL) after power is removed during the short term test

3.3

maximum power

P_{max}

the power to which a component may be exposed for up to 500 h and not experience permanent damage P_{fail} or performance drift P_{drift}

4 General description

4.1 Purpose of the component test

Testing of the component is designed to yield the following values:

a) drift (see 3.1);

b) failure (see 3.2);

failure for a component type and wavelength shall be defined as:

- for a component with an initial IL, <2 dB, the power change in the IL is $\geq 0,5$ dB;
- for a component with initial IL, of 2-10 dB, where the change in the IL is ≥ 1 dB;
- for a component with the initial IL ≥ 10 dB, where the change in IL is ≥ 2 dB;

c) maximum power (see 3.3).

4.2 Procedures

The preferred test procedure is the full characterization option. However, if conditions are such that implementation of this procedure is impractical, there are several alternative methods available in this standard. One of the following levels of qualification must be chosen and successfully executed for a component to be used in a high power application.

- Method 1 – full characterization: this level of testing is preferred, as it gives the most information on the overall optical power capabilities of the component.
- Method 2 – full characterization at a specific wavelength: this level of testing is recommended if full characterization is not possible at all wavelengths.
- Method 3 – characterization based upon application: this level of testing can be performed if time and resource constraints permit only limited testing. It should be noted that if this option is chosen and the application conditions change, the device may be required to undergo complete re-testing in order to maintain its qualification status.

Test samples may be put in series and tested simultaneously in both the short term and the long term tests for all three test methods. (This is often referred to as 'daisy-chaining'). However, the last sample in the series must see the required test power level. In practice, this will mean that samples at the beginning of the series will receive optical powers higher than those further down the chain. Products using this technique may only claim verification to the power level seen by the last sample in the chain.

4.3 Precautions

This test procedure involves the use of optical powers, which constitute a potential ocular and skin hazard to test personnel. All necessary safety procedures shall be adopted in accordance with IEC 60825-1. In particular, the device under test shall be unpowered (that is, with no power propagating in the fibre) when conducting a visual examination.

5 Apparatus

5.1 Source unit (S)

The source unit consists of an optical emitter, the means to connect to it, and the associated device electronics. It shall be stable in output power and wavelength over a time period sufficient to record the performance of the device under test. The source shall have the following characteristics:

- wavelength accuracy: ± 5 nm;
- output power stability : $\pm 0,05$ dB.

NOTE 1 A tunable light source (TLS) in which a specific output wavelength can be tuned across a specified wavelength range may be chosen as the light source. A TLS may consist of a tunable LD and an optical amplifier or fiber ring laser in order to get an efficient power to test.

NOTE 2 For DWDM devices, wavelength accuracy and wavelength width should be chosen in accordance with its operating passband.