

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

Optical circuit boards –  
Part 3: Performance standards – General and guidance

Cartes à circuits optiques –  
Partie 3: Normes de performance – Généralités et guide

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**OPTICAL CIRCUIT BOARDS –****Part 3: Performance standards –  
General and guidance**

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International Standard IEC 62496-3 has been prepared by IEC technical committee 86: Fibre optics.

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

FDIS	Report on voting
86/380/FDIS	86/387/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.

A list of all the parts in the IEC 62496 series, under the general title *Optical circuit boards*, can be found on the IEC website.

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

- reconfirmed,
- withdrawn,
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## INTRODUCTION

Performance standards define standard electro-optical performance under a set of prescribed conditions and contain a series or a set of tests and measurements (which may or may not be grouped into a specific schedule) with clearly defined conditions, severities and pass/fail criteria. The tests are intended to be run as an initial design verification to prove the product's ability to satisfy the requirements of a specific application, market sector or user group.

The following clauses in this part of IEC 62496 contain those sets of performance criteria that have been standardized for international use. A product that has been shown to meet all the requirements of a performance standard may be declared as complying with that performance standard.

Products from one manufacturer that are tested to a performance standard will operate together within the bounds of the criteria set by the performance standard. There is however no guarantee that products from different suppliers having the same standard interface, which have been independently tested to a performance standard, will meet the same levels of optical performance when mated together as those supplied by one manufacturer.

Compliance with a performance standard demonstrates that a product has passed a design verification test; it is not a guarantee of lifetime assured performance or reliability. Both service life tests and reliability testing must be the subject of a separate test schedule where the tests and severities selected are such that they are truly representative of the requirements of these test programmes. Consistency of manufacture should be maintained using a recognized quality assurance programme, while the reliability of the product should be evaluated using the procedures recommended in IEC 62005 series and IEC 61751.

When possible, tests and measurements should be selected from the IEC 61300 series. Where this is not possible, the required test method should be attached as an annex to the performance standard.

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## OPTICAL CIRCUIT BOARDS –

### Part 3: Performance standards – General and guidance

#### 1 Scope

This part of IEC 62496 covers general information on optical circuit board performance standards. It defines those tests and severities which form the performance categories or general operating service environments and identifies those tests which are considered to be product-specific. Test and severity details are given in Annex A. IEC 62496-3 provides references, definitions and rules for creating optical circuit board performance standards, as well as related information pertinent to the subject.

Subsequent parts of the IEC 62496-3 series are sequentially numbered and contain performance criteria for specific applications. Each part will be added as the performance criteria become standardized for international use.

#### 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 61300-2-18, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-18: Tests – Dry heat – High temperature endurance*

IEC 61300-2-19, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-19: Tests – Damp heat (steady state)*

IEC 61300-2-22, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-22: Tests – Change of temperature*

IEC 61753-1, *Fibre optic interconnecting devices and passive components performance standard – Part 1: General and guidance for performance standards*

#### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

##### 3.1

##### **operating/service environment**

typical service environment or operating location simulated by a performance category

##### 3.2

##### **performance category**

series of tests and measurements (which may or may not be grouped into a specific sequence) with clearly stated conditions and severities, which are chosen to simulate a particular operating service environment



### 3.3 performance standard

standard designed to verify a product which is capable of meeting the requirements of a particular service environment

NOTE It contains a combination of those tests, together with their severities and pass-fail criteria, which shall be applied to all optical circuit boards for a particular performance category, together with those which are considered specific to that particular product in that environment.

### 3.4 product specific tests

those tests which are considered to be specific to a particular product type, e.g. flexible optical circuit boards, rigid optical circuit board, optical fibre circuit boards, or waveguide circuit boards

NOTE Where there is a specific IP (International Protection, IEC 60529) for a product, this shall be the subject of a separate test and shall be included in the relevant product performance standard.

### 3.5 performance standard test report

report to be produced on completion of testing to a performance standard

## 4 Preparation of a performance standard

### 4.1 General

In the preparation of a performance standard, the following items shall be considered and instructions pertaining to them included:

- product definition,
- tests,
- details,
- requirements,
- sample size,
- groupings/sequences,
- pass/fail criteria,
- reference product definition.

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### 4.2 Product definition

The product to which the performance standard relates shall be clearly defined.

### 4.3 Tests

The tests to be carried out on the product in order for it to meet the performance standard shall be clearly defined. No ambiguity or options shall be allowed.

The tests selected, combined with the severities/durations, groupings/sequencing, method used and pass/fail criteria, should be indicative of a defined product location within a service environment.

The test method to be used shall be clearly defined for each test. Wherever possible the test method shall be selected from IEC referenced tests; where this is not possible other test methods may be defined. If a previously undefined test method is used, the test method and details to be specified shall be included in an annex of the performance standard.

#### 4.4 Details

Severities, durations and the details to be considered shall be given for all tests and measurements presented in a performance standard. These shall be directly related to the requirements specified for a product location within a service environment to which the performance standard is intended to correspond. No ambiguity or options shall be allowed.

#### 4.5 Requirements

The performance requirements that shall be satisfied in order for the product to comply with the standard shall be specified for each test and/or measurement. No ambiguities shall be allowed.

#### 4.6 Sample size

The sample size for each test shall be defined in an annex of the performance standard. No deviations shall be allowed.

#### 4.7 Groupings/sequences

Test groups and test sequences shall be defined in an annex as required by the user, user group or manufacturer. The number of samples for each test group shall also be defined in the annex. Where prohibitive cost is associated with the active devices, numbers of samples may be reduced.

#### 4.8 Pass/fail criteria

The pass/fail criteria shall be unambiguously stated for each test within the performance standard. No deviation or exceptions shall be allowed.

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#### 4.9 Reference product definition

Where a reference product is called for in any of the test and measurement methods used within a performance standard, the reference product shall be clearly defined in an annex of the performance standard.

#### 4.10 Performance standard test report

Conformance with a performance standard shall be supported by a test report. The test report may be prepared by an independent test laboratory. The test report shall clearly demonstrate that the tests were carried out as per the requirements of the performance standard and provide full details of the tests, together with a pass/fail declaration.

Any product failing a particular test or sequence of tests shall be reported in the performance standard test report. The cause of the failure shall be given and any corrective action taken shall be described.

If no design changes are made to the product, the test or test sequence where the failure occurred shall be rerun with the results of both the tests reported.

Any design changes shall be identified in the performance standard test report. The full set of performance tests must be rerun and the results reported in this case.

## Annex A (normative)

### Tests and severities for performance standards

This annex contains the preferred tests and recommended severities associated with these tests for typical system locations in which optical circuit boards may be installed (see Tables A.2 to A.3).

Where tests have been grouped it is intended that the tests be run as a group, in the order indicated, to simulate a particular aspect of the conditions to which the product may be submitted.

The general system location for which performance standard schedules are provided is given in Table A.1.

**Table A.1 – General operating service environments and definitions**

Category (IEC 61753-1)	Environment	Temperature range °C	Water/Humidity	Typical location
C	Controlled	–10 to +60	85 % maximum RH	In a building
U	Uncontrolled	–25 to +70	Uncontrolled RH	Temperate outdoors
O	Outside plant	–40 to +75	Uncontrolled RH	Sheltered outdoors
E	Extreme	–40 to +85	May be liable to water immersion	Unsheltered outdoors

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Table A.1 indicates the ambient temperature ranges for optical network equipment under various environmental categories described in IEC 61753-1 and does not indicate the operating temperature ranges for optical circuit boards. The operating temperature range for each optical circuit board shall be specified by its case temperature, unless otherwise stated, and defined in each performance standard document in order that the optical circuit board operates under the specific environmental category described in Table A.1. The system designer should design the heat flow of the equipment to maintain the case temperature of the installed optical circuit boards within their specifications. The performance tests for each optical circuit board should be carried out within the specified case temperature range.

**Table A.2 – Category C – Controlled environment  
(Flexible optical circuit boards using optical glass fibres)**

Test	Severity
Bending endurance of OCB body	Bending radius of OCB body: 30mm Number of cycles: 10
Static pressure endurance of OCB body	Pressure: 0,98 kPa
High temperature endurance IEC 61300-2-18	+60 °C ± 2 °C 96 h duration
Damp heat Steady state IEC 61300-2-19	+40 °C ± 2 °C (93 ± 2) % RH 96 h duration
Change of temperature IEC 61300-2-22, Test b	–10 °C ± 2 °C to +60 °C ± 2 °C Duration at each dwell temperature: 1 h 1 °C/min rate of change 5 cycles