

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Fibre optic interconnecting devices and passive components – Performance standard –
Part 1: General and guidance**

**Dispositifs d'interconnexion et composants passifs fibroniques – Norme de performance –
Partie 1: Généralités et recommandations**



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**Dispositifs d'interconnexion et composants passifs fibroniques – Norme de performance –
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COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC INTERCONNECTING DEVICES AND
PASSIVE COMPONENTS – PERFORMANCE STANDARD –****Part 1: General and guidance**

FOREWORD

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International Standard IEC 61753-1 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 2007. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) definitions updated with new products: wall outlets, wall or pole mounted boxes, splices, ODF modules, street cabinets, hardened connectors and field mountable connectors;
- b) categories U and O are replaced by categories OP and OP+. No mandatory sequence in category OP+. Category OP+ contains the tests from category OP with the addition of only 4 other tests;
- c) addition of Category I (Industrial);

- d) temperature ranges added (with the HD suffix to the categories C, OP, OP+ and I) in case passive optical components are placed in a housing together with active electronics (HD stands for “heat dissipation”);
- e) the height of category A changed from 3 m to ground level (0 m);
- f) the lower level height of category G environment changed from ground level (0 m) to –1 m below ground level. Upper level remains at 3 m above ground level;
- g) addition of performance tests, test severities and performance criteria for new products: Wall outlet, wall or pole mounted boxes, mechanical splices, fusion splice protectors, ODF modules, street cabinets, field mountable connectors and hardened optical connectors;
- h) test severity of "Mating durability" test for connectors in categories C, OP, OP+ and I is reduced to 200 cycles for connectors with cylindrical ferrules and 50 cycles for connectors with rectangular ferrules;
- i) test severity of "Change of temperature" test for connectors and passive optical components in category I is reduced from 20 cycles to 12 cycles (harmonized with connectors and components from other categories);
- j) test severity of "Flexing of strain relief" test for connectors in categories C, OP and OP+ is reduced to 50 cycles;
- k) test severities of "Assembly and disassembly of fibre optic mechanical splices, fibre management systems and closures" test for all enclosures is reduced to 5 cycles;
- l) test severities of "Change of temperature" test for all protective housings in categories C, A, G and S is reduced from 20 cycles to 12 cycles (harmonized with connectors and components);
- m) test severities of "Resistance to solvents and contaminating fluids" test for closures in categories G and S changed – kerosene is removed, diesel oil exposure reduced to 1 h immersion and 24 h drying at room temperature;
- n) sealing performance criteria of sealed closures for categories G and A are reduced to 20 kPa overpressure;
- o) the change in attenuation criterion for connectors has changed from peak-to-peak into a +/- deviation from the original value of the transmitted power at the start of the test (harmonized with the change in attenuation criterion for components, splices and protective housings).

The text of this International Standard is based on the following documents:

FDIS	Report on voting
86B/4131/FDIS	86B/4137/RVD

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

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

A list of all parts in the IEC 61753 series, published under the general title *Fibre optic interconnecting devices and passive components – Performance standard*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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The contents of the corrigendum of May 2019 have been included in this copy.

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INTRODUCTION

The IEC 61753 series is dealing with performance standards for all passive fibre optic products, including connectors, passive optical components, fibre management systems and various protective housings. The standard is published in multiple parts. This part, Part 1, covers general information on performance standards. Subsequent parts are known as performance standards and are numbered according to the classification defined in Annex B. These standards contain the minimum test and measurement severities which are common to all passive fibre optic products, for a particular service environment or performance category, and the test and measurement severities which are considered specific to that particular product in that environment.

Performance Standards define the requirements for standard optical performance under a set of specified conditions. Each standard contains a series or a set of tests and measurements with clearly stated conditions, severities and pass/fail criteria. The series of tests, commonly referred to as an operating service environment or performance category, is intended to be run on a 'one-off' basis to prove the product's ability to satisfy the requirements of a specific application, market sector or user group.

This document define those sets of tests which form each operating service environment or performance category and which have been standardised for international use. A product that has been shown to meet all the requirements of a performance standard can be declared as complying with that performance standard.

Products having the same classification from one manufacturer that satisfy a performance standard, will operate within the boundaries set by the performance standard. Interchangeability or interchangeability of products from different suppliers (having the same classification and conforming to the same performance standard) can only be guaranteed when these products also meet the interface standards. Only in this condition will an equivalent level of performance be provided when they are used together (for example in the case of optical connectors).

Conformance to a performance standard is not a guarantee of lifetime assured performance or reliability. Reliability testing is the subject of a separate test schedule, where the tests and severities selected are truly representative of the requirements of this reliability test programme. Consistency of manufacture will be maintained using a recognised quality assurance programme whilst the reliability of product will be evaluated using the procedures recommended in IEC 62005 (all parts).

Tests and measurements are selected from IEC 61300 (all parts). Where this is not possible, the required test method is attached as an annex to the performance standard.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

Part 1: General and guidance

1 Scope

This part of IEC 61753 provides guidance for the drafting of performance standards for all passive fibre optic products.

This document defines the 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.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60529, *Degrees of protection provided by enclosures (IP Code)*

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

IEC 61300-2-1, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-1: Tests – Vibration (sinusoidal)*

IEC 61300-2-2, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-2: Tests – Mating durability*

IEC 61300-2-4, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-4: Tests – Fibre/cable retention*

IEC 61300-2-5, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-5: Tests – Torsion*

IEC 61300-2-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-6: Tests – Tensile strength of coupling mechanism*

IEC 61300-2-7, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-7: Tests – Bending moment*

IEC 61300-2-9, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-9: Tests – Shock*

IEC 61300-2-10, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-10: Tests – Crush resistance*

IEC 61300-2-11, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-11: Tests – Axial compression*

IEC 61300-2-12, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-12: Tests – Impact*

IEC 61300-2-17, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-17: Tests – Cold*

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 61300-2-21, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-21: Tests – Composite temperature/humidity cyclic test*

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

IEC 61300-2-23, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-23: Tests – Sealing for non-pressurized closures of fibre optic devices*

IEC 61300-2-26, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-26: Tests – Salt mist*

IEC 61300-2-27, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-27: Tests – Dust – Laminar flow*

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IEC 61300-2-28, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-28: Tests – Corrosive atmosphere (sulphur dioxide)*

IEC 61300-2-33, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-33: Tests – Assembly and disassembly of fibre optic mechanical splices, fibre management systems and closures*

IEC 61300-2-34, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-34: Tests – Resistance to solvents and contaminating fluids of interconnecting components and closures*

IEC 61300-2-35, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-35: Tests – Cable nutation*

IEC 61300-2-37, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-37: Tests – Cable bending for fibre optic closures*

IEC 61300-2-38, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-38: Tests – Sealing for pressurized fibre optic closures*

IEC 61300-2-42, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-42: Tests – Static side load for strain relief*

IEC 61300-2-44, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-44: Tests – Flexing of the strain relief of fibre optic devices*

IEC 61300-2-45, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-45: Tests – Durability test by water immersion*

IEC 61300-2-46, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-46: Tests – Damp heat, cyclic*

IEC 61300-2-50, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-50: Tests – Fibre optic connector proof test with static load – Singlemode and multimode*

IEC 61300-3-3, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-3: Examinations and measurements – Active monitoring of changes in attenuation and return loss*

IEC 61300-3-4, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-4: Examinations and measurements – Attenuation*

IEC 61300-3-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-6: Examinations and measurements – Return loss*

IEC 61300-3-7, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-7: Examinations and measurements – Wavelength dependence of attenuation and return loss of single mode components*

IEC 61300-3-28, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-28: Examinations and measurements – Transient loss*

IEC 61300-3-29, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-29: Examinations and measurements – Spectral transfer characteristics of DWDM devices*

IEC 61300-3-34, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-34: Examinations and measurements – Attenuation of random mated connectors*

IEC 61300-3-45, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-45: Examinations and measurements – Attenuation of random mated multi-fibre connectors*

IEC Guide 109, *Environmental aspects – Inclusion in electrotechnical product standards*

ISO 1998-1:1998, *Petroleum industry – Terminology – Part 1: Raw materials and products*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

NOTE Terms and definitions for various components can be found in IEC TS 62538 and in the relevant IEC 61753 series performance standards.

3.1

adaptor

component that permits mating between a connector and another optical component

Note 1 to entry: Another optical component is a connector plug, an active device, a passive optical component.

3.2

box

free breathing housing that is permanently fixed to a wall or pole

Note 1 to entry: A box is not specifically designed to allow cable movement (e.g. torsion, bending) at the cable ports during operation.

3.3

connector

component normally attached to a cable or piece of apparatus for the purpose of providing interconnection and disconnection of fibre optic cables

3.4

fibre management system

FMS

system to control, protect and store splices, connectors, passive optical components and fibres from incoming to outgoing cables

Note 1 to entry: Splice trays or organiser trays are parts of a fibre management system.

3.5

fibre splice

permanent or separable joint between optical fibres achieved by either fusion splicing or mechanical splicing

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3.6

field mountable connector

FMC

connector which is mounted directly onto fibre or fibre cable in the field

3.7

free breathing closure

protective housing that allows a free exchange of air with the environment

Note 1 to entry: A free breathing closure may look like a sealed closure, but it is not designed to hold a varying overpressure or underpressure caused by temperature changes or atmospheric pressure changes. Free breathing closures are used in aerial environments for the interconnection of cables.

Note 2 to entry: Limited water ingress and/or limited dust ingress is possible. Free breathing closures are not intended for use in areas that are subject to flooding or water immersion.

3.8

hardened fibre optic connector

water and dust tight connector

Note 1 to entry: A hardened fibre optic connector is typically used as connection in outside plant.

3.9

MICE

classification system that describes the environment conditions that are local to a channel based upon the following factors:

- mechanical (M),
- ingress (I),
- climatic and chemical (C),

– electromagnetic (E)

Note 1 to entry: The term MICE is referenced in the generic cabling standards produced by ISO/IEC JTC1 SC25 and relates to the classification of the environment local to the cabling channel.

There are four primary environmental criteria used to classify an environment:

- the M element, defining the mechanical characteristics of the environment;
- the I element, defining the ingress protection characteristics of the environment;
- the C element, defining the climatic and chemical characteristics of the environment;
- the E element, defining the electromagnetic characteristics of the environment.

Each of the four primary environmental criteria is further divided into specific parameters and levels for those parameters. The MICE classification for a given location is therefore defined as MalbCcEd where a, b, c and d are the individual sub-classifications (levels) for the M, I, C and E criteria respectively.

The suffices for the four primary environmental criteria are either 1, 2 or 3. For example, the most benign environment is described as M111C1E1 whereas the most harsh environment would be defined as M313C3E3.

Note 2 to entry: The E element is considered not relevant to passive optical components.

[SOURCE: ISO/IEC 24702:2006, 3.1.11, modified – The notes have been added.]

3.10
optical distribution frame module
ODF module
ODFM

housing which is mountable in a supporting structure

Note 1 to entry: An ODFM contains a fibre management system and can provide rearrangeable interconnections between the incoming to the outgoing cables.

Note 2 to entry: The supporting structure that houses the ODFM is often called an equipment rack.

3.11
operating service environment
 typical service environment or operating location simulated by a performance category

3.12
performance category

series of tests and measurements with clearly stated conditions and severities, which are chosen to simulate a particular operating service environment

3.13
performance standard

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

Note 1 to entry: A performance standard contains a combination of those tests, together with their severities and pass-fail criteria, which are applied to all passive fibre optic products for a particular performance category, together with those which are considered specific to that particular product in that environment.

3.14
performance standard test report

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

3.15
product specific tests

tests which are considered to be specific to a particular product category or type

Note 1 to entry: Where there is a specific IP requirement for a product, this is the subject of a separate test and is included in the relevant product performance standard.

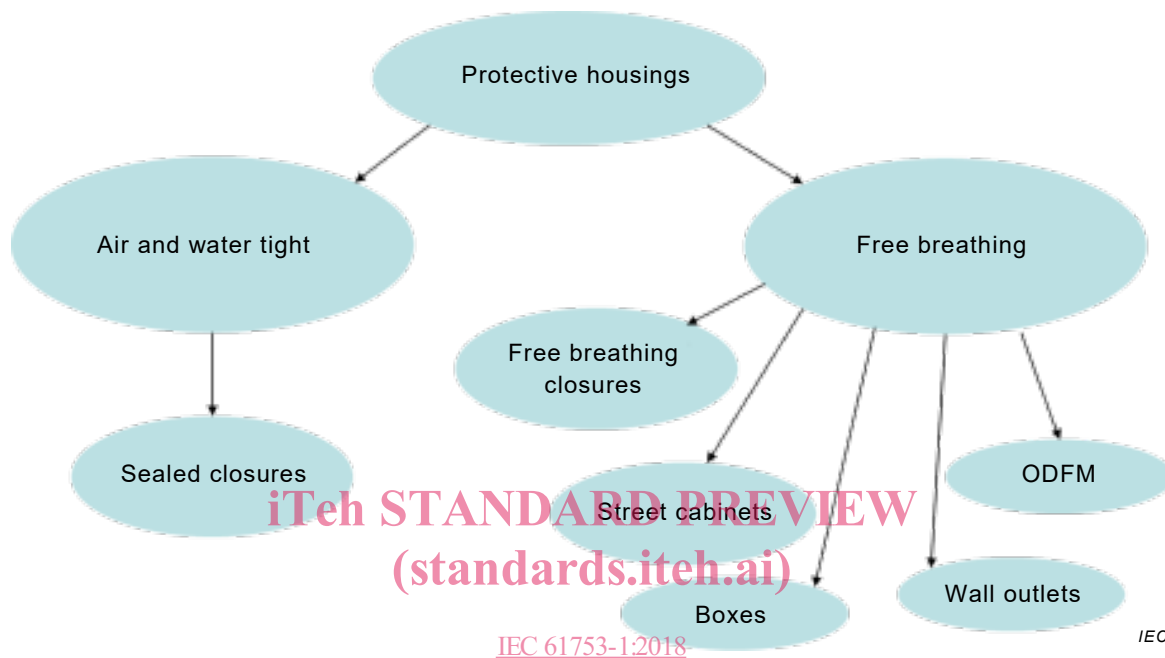
Note 2 to entry: Where there is a specific requirement for a product, this is the subject of a separate test and is included in the relevant product performance standard.

3.16 protective housing

indoor and outdoor housing utilised for the storage, distribution or protection of one or more cable joints or any passive or active telecom equipment

Note 1 to entry: Examples of protective housings: wall boxes, cabinets, cases, optical distribution frame sub racks, closures or pedestals as shown in Figure 1. A closure can be either a "sealed closure" or a "free breathing closure".

Note 2 to entry: The protective housing contains a fibre management system.



IEC 61753-1:2018
<https://standards.iteh.ai/catalog/standards/sist/0ff7cbcc-3203-4ea4-947c->
Figure 1 – Relationship between various protective housing types

3.17 sealed closure

watertight and dust-tight housing that can hold a varying overpressure or underpressure caused by temperature changes or atmospheric pressure changes

Note 1 to entry: There is no exchange of air with the outside environment when exposed to temperatures over the specified operating temperature range.

Note 2 to entry: Although often referred to as hermetic sealed closures, humidity can enter the inner closure by diffusion.

Note 3 to entry: Sealed boxes or sealed wall outlets shall be treated as sealed closures.

Note 4 to entry: Complete inner filled housings are also considered to be sealed closures.

3.18 street cabinet

free outdoor breathing above ground-installed housing that is permanently attached to the ground

Note 1 to entry: A street cabinet is permanently fixed to the ground and is not specifically designed to allow cable movement (e.g. torsion, bending) during operation.

3.19 wall outlet

free breathing housing with fixed connecting devices where the horizontal cable terminates

Note 1 to entry: The wall outlet provides the interface to work area cabling.