

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Fibre optic interconnecting devices and passive components – Basic test and measurement procedures –
Part 2-27: Tests – Dust (laminar flow)**

**Dispositifs d'interconnexion et composants passifs fibroniques – Procédures fondamentales d'essais et de mesures –
Partie 2-27: Essais – Poussière (écoulement laminaire)**

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IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC INTERCONNECTING
DEVICES AND PASSIVE COMPONENTS –
BASIC TEST AND MEASUREMENT PROCEDURES –****Part 2-27: Tests – Dust (laminar flow)**

FOREWORD

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IEC 61300-2-27 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics. It is an International Standard.

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

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

- a) normative references have been added;
- b) the relative humidity requirement during the test has been modified;
- c) the procedure description has been modified;
- d) Figure 1 showing possible test configurations has been added;
- e) the severity of the test has been updated according to the component and performance category;
- f) Clause 8 has been added, listing details to be specified and reported.

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

Draft	Report on voting
86B/4875/FDIS	86B/4910/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts of IEC 61300 series, published under the general title *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures*, 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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

Part 2-27: Tests – Dust (laminar flow)

1 Scope

The purpose of this part of IEC 61300 is to determine the effects of dust on fibre optic interconnecting devices or passive components.

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 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 3-1: Examinations and measurements – Visual examination*

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*

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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 61300-3-35, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-35: Examinations and measurements – Visual inspection of fibre optic connectors and fibre-stub transceivers*

IEC 61753 (all parts), *Fibre optic interconnecting devices and passive components – Performance standard*

IEC 62005 (all parts), *Fibre optic interconnecting devices and passive components – Reliability*

IEC TR 62627-01, *Fibre optic interconnecting devices and passive components – Part 01: Fibre optic connector cleaning methods*

IEC TR 62572-4, *Fibre optic active components and devices – Reliability standards – Part 4: Guidelines for optical connector end-face cleaning methods for receptacle style optical transceivers*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

4 General description

The device under test (DUT) is exposed to a specified dust concentration within a conditioning chamber in which the air is circulated for a period of time. The effects of dust exposure on optical performance and physical integrity of the DUT shall be determined.

5 Apparatus

5.1 Test chamber

The test chamber shall be capable of controlling the dust concentration, velocity, temperature, and humidity of the dust-laden air. It shall be capable of being raised to and maintained at a temperature of $63\text{ °C} \pm 2\text{ °C}$ with a relative humidity not exceeding 25 %. In order to provide adequate circulation of the dust-laden air, no more than 50 % of the cross-sectional area (normal to the air flow) and no more than 30 % of the volume of the chamber shall be occupied by the DUT. The dust-laden air shall be introduced into the chamber in such a manner as to allow it to become approximately laminar in the flow before striking DUT.

5.2 Dust

The dust shall be capable of passing through a sieve of 150 μm aperture. Dust type shall be talc powder, unless otherwise specified in the relevant IEC 61753 series performance standard or IEC 62005 series reliability document.

5.3 Optical measurement equipment

For optical performance measurement, the equipment and measurement methods shall be according to IEC 61300-3-4 for attenuation and IEC 61300-3-6 for return loss. For changes in attenuation and return loss, the equipment and measurement method shall be done according to IEC 61300-3-3. The optical performance measurement shall be performed at the wavelength(s) specified in the relevant IEC 61753 series performance standard or IEC 62005 series reliability document.

6 Procedure

6.1 Preparation of DUT

Visually examine DUT according to IEC 61300-3-1. Clean the mechanical and optical alignment parts of the DUT according to IEC TR 62627-01 and IEC TR 62572-4 and afterwards, inspect the optical parts by means of IEC 61300-3-35. If test Configuration A is used, the DUT shall be terminated onto a sufficient length of fibre cables. The loose ends of the cables may be terminated with an interconnecting device to facilitate interfacing with the optical measurement equipment.

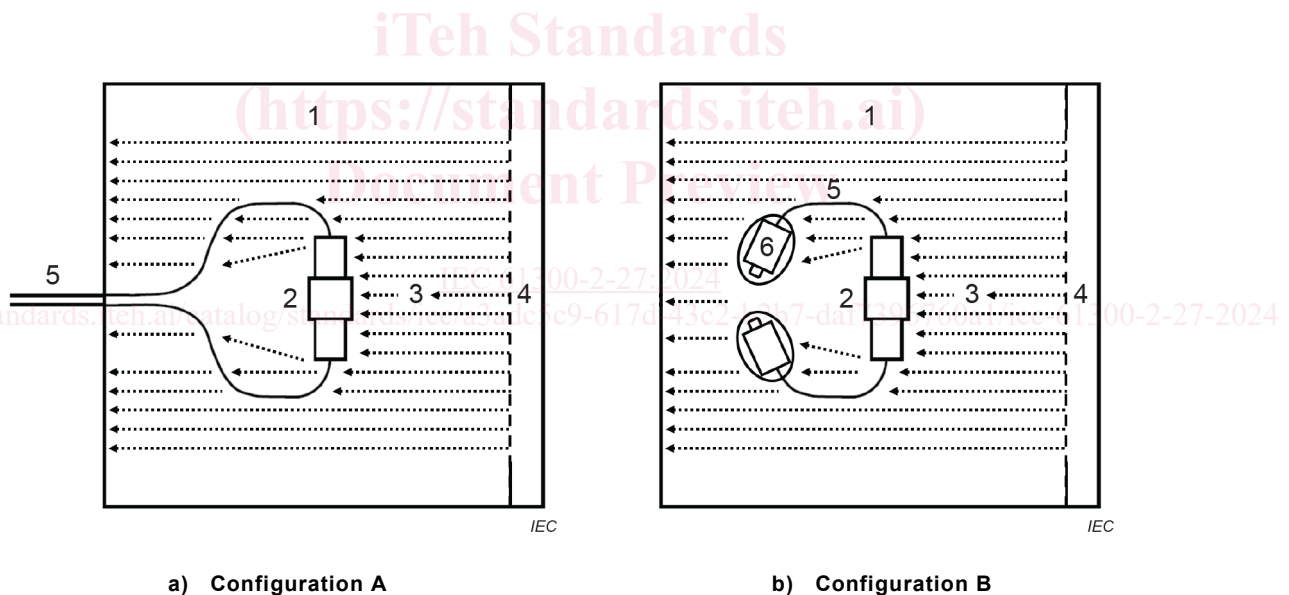
6.2 Preconditioning

Precondition the DUT for a minimum of 2 h at the standard atmospheric conditions specified in IEC 61300-1.

6.3 Mounting of DUT

The DUT shall be mounted and positioned as near to the centre of the test chamber as practicable. If more than one DUT is being tested, there shall be a minimum clearance of 100 mm between surfaces of the DUTs and any other object or material which would provide protection. No surface of the DUT shall be any closer than 100 mm to any wall of the test chamber. The DUT shall be orientated to expose the most critical or vulnerable parts to the dust stream. Changes in DUT orientation during the test shall be specified in the relevant IEC 61753 series performance standard or IEC 62005 series reliability document.

Two possible test configurations for optical measurements are: Configuration A depicted in Figure 1 a) with loose ends of the termination cables located outside the test chamber, and Configuration B depicted in Figure 1 b) with entire termination cables put inside the chamber. When termination cables have interconnecting devices on the loose ends, they shall be dust-protected and positioned so not to disturb laminar dust-laden air flow. Configuration A shall be used for monitoring the optical performance during the test. For optical measurements before or after the test, either Configuration A or Configuration B may be used, whichever is more practicable.



Key

- 1 test chamber
- 2 DUT
- 3 laminar dust-laden air stream
- 4 dust feeder
- 5 termination fibre cable(s)
- 6 dust-protected interconnecting device(s)

Figure 1 – Possible test configurations

6.4 Measure of initial optical properties

Measure the optical properties specified in the relevant IEC 61753 series performance standard or IEC 62005 series reliability document, such as attenuation and return loss. These values shall be recorded and used as a reference for the test evaluation.

For test Configuration B, initial optical properties shall be recorded before mounting DUT inside the test chamber.

6.5 Monitoring of optical properties

By default, monitoring of the optical performance during the test is not required. If monitoring of optical performance during the test is required by the relevant IEC 61753 series performance standard or IEC 62005 series reliability document, then the change in optical properties, such as attenuation and return loss of the DUT, shall be monitored during the initial dust exposure and dust exposure periods, as described in IEC 61300-3-3. The optical properties shall be measured at the interval specified in the relevant IEC 61753 series performance standard or IEC 62005 series reliability document.

6.6 Initial dust exposure

Set the chamber controls to maintain an internal chamber temperature of $23\text{ °C} \pm 2\text{ °C}$ and a relative humidity of less than 25 %. Adjust the air velocity to $530\text{ m/min} \pm 70\text{ m/min}$. Adjust the dust feeder to control the dust concentration to the specified severity. Maintain these chamber conditions for the specified duration (refer to Table 1).

6.7 Thermal conditioning

Upon completion of the initial dust exposure period, stop the dust feed and reduce the air velocity to $90\text{ m/min} \pm 50\text{ m/min}$. Raise the internal chamber temperature to $63\text{ °C} \pm 2\text{ °C}$. The rate of change of temperature shall be $2\text{ °C/min} \pm 1\text{ °C/min}$. Maintain a relative humidity of less than 10 %.

6.8 Dust exposure

Upon completion of the thermal conditioning period, maintain the temperature at $63\text{ °C} \pm 2\text{ °C}$. Increase the air velocity to $530\text{ m/min} \pm 70\text{ m/min}$. Adjust the dust feeder to control the dust concentration to the specified severity. Maintain a relative humidity of less than 10 %. Maintain these chamber conditions for the specified duration (refer to Table 1).

6.9 Recovery

Upon completion of the test, turn off all chamber controls and allow the DUT to return to standard atmospheric conditions.

For Configuration A, proceed with final measurements as described in 6.10 and then continue with the rest of recovery procedures.

For Configuration B, proceed with the rest of recovery procedures.

Remove the DUT from the chamber. Remove accumulated dust from the DUT by brushing, wiping, or shaking, ensuring no additional dust is introduced into the DUT. Dust shall not be removed by either air blast or vacuum cleaning. DUT shall be kept for a minimum of 2 h at standard atmospheric conditions before proceeding with final measurements and examinations. Standard cleaning procedures of termination cables attached interconnecting devices may be used prior reconnecting with optical measurement equipment.