

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Dispositifs d'interconnexion et composants passifs fibroniques – Procédures fondamentales d'essais et de mesures –
Partie 2-22 : Essais – Variations de température**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC INTERCONNECTING
DEVICES AND PASSIVE COMPONENTS –
BASIC TEST AND MEASUREMENT PROCEDURES –****Part 2-22: Tests – Change of temperature**

FOREWORD

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IEC 61300-2-22 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 third edition cancels and replaces the second edition published in 2007. This edition constitutes a technical revision.

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

- a) include a passive component, patch cord, splices, fibre management system or protective housing to withstand the effects of a change of temperature or a succession of changes of temperature into the project scope;

- b) update the severity categories description, number of cycles, and duration of the extremes in Table 1 to be in line with IEC 61753-1.

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

Draft	Report on voting
86B/4904/FDIS	86B/4931/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 the 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

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

Part 2-22: Tests – Change of temperature

1 Scope

This part of IEC 61300 describes a procedure to determine the suitability of a fibre optic interconnecting device and a passive component to withstand the effects of a change of temperature or a succession of changes of temperature.

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 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

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

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 61300-3-1, *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*

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

IEC 62005 (all parts), *Reliability of fibre optic interconnecting devices and passive components*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61300-1 apply.

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

This procedure is conducted in accordance with IEC 60068-2-14, test Nb, change of temperature with specified rate of change.

The device under test (DUT) is first subjected to one extreme of temperature for a given period of time. It is then subjected to the other extreme of temperature for an equal period of time. It can be subjected to one or more changes of temperatures defined by the temperature profile and the number of cycles.

5 Apparatus

5.1 Environmental test chamber

A suitable environmental test chamber shall be used in accordance with IEC 60068-2-14, Test Nb.

5.2 Examination and measurement equipment

Suitable examination and optical measurement equipment shall be used in accordance with IEC 60529, IEC 61300-2-38, IEC 61300-3-1, IEC 61300-3-3, IEC 61300-3-4, or IEC 61300-3-6 as required by the relevant IEC 61753 series performance standard or IEC 62005 series reliability document.

6 Procedure

6.1 General

The procedure is in accordance with IEC 60068-2-14, Test Nb.

6.2 Preconditioning

Maintain the DUT under standard atmospheric conditions as defined in IEC 61300-1 for at least 2 h. For large devices such as protective housings, the duration shall be at least 4 h. Clean the mechanical and optical alignment parts of the DUT according to the manufacturer's instructions.

NOTE Cleaning method for optical connector and optical transceiver are described in IEC TR 62627-01 and IEC TR 62572-4, respectively.

6.3 Initial examination and measurement

Perform initial examinations and measurements as required in the relevant IEC 61753 series performance standard or IEC 62005 series reliability document.

6.4 Setting DUT

Place the DUT in the environmental test chamber in its normal operating position and make connections to the monitoring equipment. Test sample configuration in the chamber shall be according to IEC 61300-1.

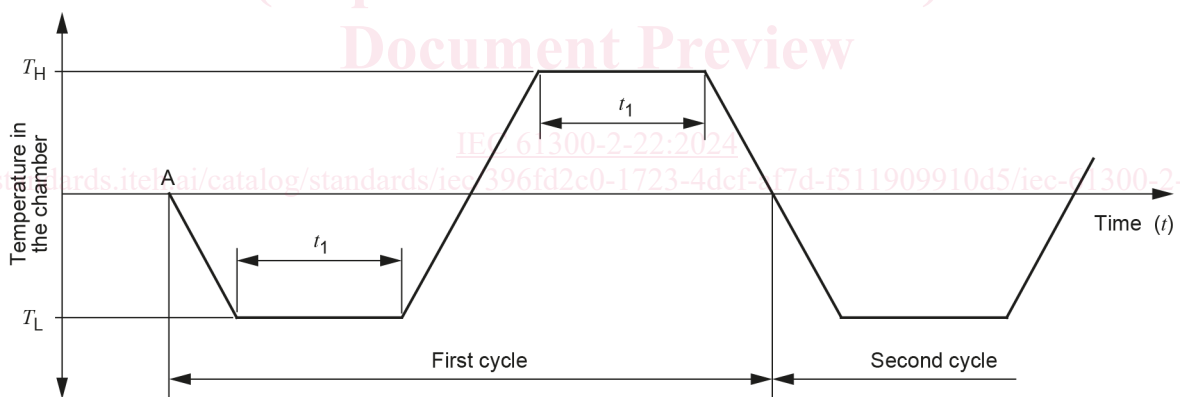
6.5 Examination and measurement during test

Perform all examinations and measurements during the test as required by the relevant IEC 61753 series performance standard or IEC 62005 series reliability document.. The following applies:

- These measurements shall be performed (at a minimum) at the end of each dwell at each temperature extreme before starting the temperature change. Use a maximum measurement period of 10 min between optical measurements during the performance test.
- Allow dependence on wavelength scan time for components that require wavelength scanning.

6.6 Test conditions

Unless otherwise specified, the temperature profile in Figure 1 shall be applied. Start at standard atmospheric conditions and ramp down to the low temperature T_L . Maintain the low temperature during t_1 for a minimum of 1 h. Ramp up to the high temperature T_H . Maintain the temperature during t_1 for a minimum of 1 h. Ramp down to the low temperature and repeat this profile for the required number of cycles. The rate of change of temperature shall be $(1 \pm 0,2) \text{ }^\circ\text{C/min}$. For larger devices, such as protective housings, the dwell time, t_1 , shall be a minimum of 4 h.



IEC

Key

- A start of the first cycle
- T_L low chamber temperature
- T_H high chamber temperature
- t_1 dwell time

Figure 1 – Temperature profile

It is permissible to increase the dwell time at each extreme to allow sufficient time to perform a complete set of measurements.

6.7 Recovery

Unless otherwise stated, maintain the DUT under standard atmospheric conditions as defined in IEC 61300-1 for at least 2 h. For large devices such as protective housings, the duration shall be at least 4 h.

6.8 Final examinations and measurements

Perform final examinations and measurements as required in the relevant IEC 61753 series performance standard or IEC 62005 series reliability document.

7 Severity

Table 1 shows the specified test severities in relation to the performance categories. It is recommended to verify the test severities with the relevant IEC 61753 series performance standards and IEC 62005 series reliability documents for the normative values.

Each of the following severities is defined by a combination of a low temperature with the corresponding high temperature exposure and the corresponding number of cycles.

Table 1 – Severities

Category	Category description	Low temperature °C	High temperature °C	Number of cycles	Dwell time h
C	Indoor controlled environment	−10 (±2)	+60 (±2)	5	1 or 4 ^a
OP	Outdoor protected environment	−25 (±2)	+70 (±2)	12	1 or 4 ^a
OP+	Extended outdoor protected environment	−40 (±2)	+75 (±2)	12	1 or 4 ^a
E	Extreme environment	−40 (±2)	+85 (±2)	12	1 or 4 ^a
I	Industrial environment	−40 (±2)	+70 (±2)	12	4
A	Outdoor aerial environment	−40 (±2)	+65 (±2)	12	4
G	Outdoor ground level environment	−40 (±2)	+65 (±2)	12	4
S	Outdoor subterranean or sub-surface environment	−30 (±2)	+60 (±2)	12	4
C ^{HD}	Indoor controlled environment with additional heat dissipation	−10 (±2)	+70 (±2)	5	1 or 4 ^a
OP ^{HD}	Outdoor controlled environment with additional heat dissipation	−25 (±2)	+85 (±2)	12	1 or 4 ^a
OP+ ^{HD}	Extended outdoor controlled environment with additional heat dissipation	−40 (±2)	+85 (±2)	12	1 or 4 ^a
I ^{HD}	Industrial environment with additional heat dissipation	−40 (±2)	+85 (±2)	12	4

NOTE A suitable operating service environment (performance category) is selected according to the application.

^a 1 h for connectors, field mountable connectors, passive components, splices and fibre management systems.
4 h for wall outlets, boxes, optical distribution frame modules and closures.