IEC 61300-2-47

Edition 4.0 2016-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – Basic test and measurement procedures –
Part 2-47: Tests – Thermal shocks

Dispositifs d'interconnexion et composants passifs fibroniques – Procédures fondamentales d'essais et de mesures –
Partie 2-47: Essais – Chocs thermiques

IEC 61300-2-47:2016-05(en-fr)

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

Part 2-47: Tests – Thermal shocks

FOREWORD

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International Standard IEC 61300-2-47 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This fourth edition cancels and replaces the third edition published in 2010. This edition constitutes a technical revision.

This edition includes the following significant technical change with respect to the previous edition: review of temperature limit in the test severity.

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

CDV	Report on voting
86B/3879/CDV	86B/3937A/RVC

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.

The reader's attention is drawn to the fact that Annex A lists an "in some-country" clause on differing practices of a less permanent nature relating to the subject of this standard.

A list of all parts in 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 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- withdrawn,
- replaced by a revised edition, or
- amended.

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

Part 2-47: Tests – Thermal shocks

1 Scope

This part of IEC 61300 details a procedure for determining the suitability of a fibre optic device to withstand the effects of thermal shock. In practice, this means a very short change over time between extreme temperatures.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 61300-3-1, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-1: Examinations and measurements – Visual examination*

3 General description

The procedure described in this standard is conducted in accordance with IEC 60068-2-14, test Na. 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.

Two test methods are considered: manual or automatic. Both methods are considered as equivalent. The reference method is the automatic one.

4 Apparatus

4.1 Testing chambers

a) Two separate chambers or one rapid temperature change rate may be used. If two chambers are used, one for the low temperature and one for the high temperature, they are located such as to allow transfer of the DUT from one chamber to the other within the prescribed time. Either manual or automatic transfer methods may be used.

b) The chambers shall be capable of maintaining the atmosphere at the appropriate temperature for the test in any region where the DUT is placed.

c) The absolute humidity of the atmosphere inside the chambers should not exceed 20 g/m^3.

   At the temperature of 60 °C and standard air pressure, the relative humidity should be less than 16 %.

d) The temperature of the walls of the hot and cold chambers shall not differ by more than 3 % and 8 % respectively from the specified ambient temperature of the test, expressed in Kelvin (tolerance of 3 % for high temperature, and 8 % for low temperature).

e) The volume of the chambers and the air velocity shall be such that after insertion of the DUT, the temperature of the atmosphere shall be within the specified tolerance after a time of not more than 10 % of the exposure time.

f) The air of the chamber shall be circulated so that the air velocity, measured close to the DUT, shall be not less than 2 m/s.

4.2 Support for mounting the DUT

Unless otherwise specified in the relevant specification, the thermal conductivity of the supports for mounting the DUT shall be low, such that for practical purposes the DUT is thermally isolated. When testing several DUTs simultaneously, they shall be so placed that free circulation should be provided between DUTs, and between DUTs and chamber surfaces.

5 Procedure

5.1 General

Conduct the test according to the following procedure.

– If the component construction includes optical leads, include 1,5 m of cable in the climatic chamber for each port monitored during the test.

– If optical measurements are requested during the test by the relevant specification, these measurements shall be performed at a maximum interval of 10 min during the extreme temperature periods.

– It is not the intention of the test to record the effects of mechanical movement of the optical cables during the movement of the DUT from one environmental chamber to the other. Therefore, the physical arrangement of the cables shall ensure that movement of the DUT does not affect the optical transmission. To verify this, optical cables similar to those attached to the DUT shall be positioned alongside the cables attached to the DUT and monitored throughout the test as a control.

5.2 Preconditioning

Unless otherwise stated in the relevant specification, maintain the DUT under standard atmospheric conditions for a minimum of 2 h. Clean the mechanical and optical alignment parts of the DUT according to the manufacturer's instructions.

5.3 Initial examination and measurement

Complete initial examinations and measurements as required by the relevant specification.

5.4 Testing

a) Place the DUT in the chamber in its normal operating position (initial temperature T_s).

b) The DUT shall be subjected to a temperature cycle according to Figure 1.

c) The DUT shall be placed in the cold chamber, the atmosphere of which has been previously adjusted to the appropriate low temperature T_A. The atmosphere in the cold chamber shall be maintained at the low temperature T_A for the appropriate period t_1 (t_1 includes an initial time for temperature stabilization of atmosphere, according to 4.1 e)).

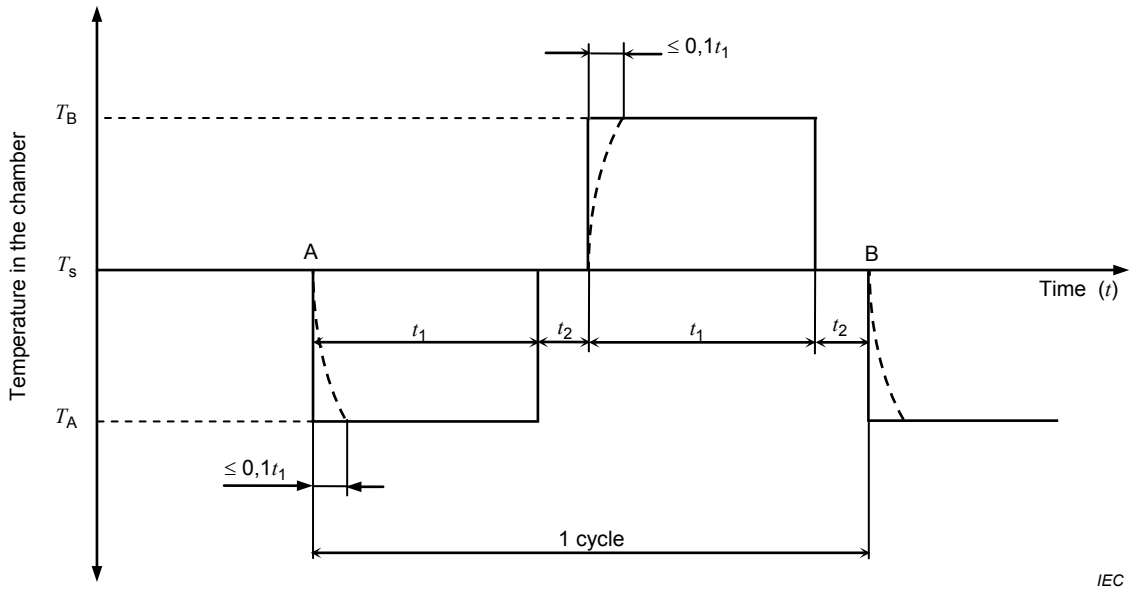
d) The DUT shall then be removed from the cold chamber and transferred to the hot chamber in a changeover time t_2 not more than 3 min. In the case of automatic two-chamber test equipment, a changeover period shall be less than 30 s. The transition time shall include the time of removal from one chamber and the insertion into the second chamber as well as any dwell time at the ambient temperature of the laboratory.

e) The atmosphere in the hot chamber shall be maintained at the high temperature T_B for the appropriate period t_1.

f) For the next cycle, the DUT shall be transferred to the cold chamber in a transition time t_2.

NOTE The exposure time is measured from the moment of insertion of the DUT into the chamber.

The first cycle includes the two exposure times t_1 and the two changeover times t_2 (see Figure 1).



Key

A start of first cycle

B end of first cycle and start of second cycle

NOTE The dotted curve is explained in 4.1 e).

Figure 1 – Temperature change cycle

5.5 Recovery

Dry the DUT if necessary and allow it to remain under standard atmospheric conditions for a period of 2 h.

5.6 Final examination and measurement

On completion of the test, remove all fixtures. Clean the mechanical and optical alignment parts of the DUT according to the manufacturer's instructions. Take final measurements as required by the relevant specification. If specified, visually examine the DUT in accordance with IEC 61300-3-1 and take any measurements specified to ensure that there is no permanent damage.

6 Severity

The severity consists of the combination of the low temperature, high temperature, duration, changeover time and number of cycles.

The following severity shall be used for this procedure:

Conditions:

– Temperature limits: ΔT

  The following three options shall be applied.

  a) ΔT = 100 °C (T_A and T_B are within the operating temperature range)

b) T_A: lowest operating temperature, T_B: highest operating temperature (ΔT is less than 100°C)

c) T_A = 0 °C, T_B = 100 °C

– Duration at extreme temperature: $t_1 \geq$ 30 min

– Changeover time:

- manual test: $t_2 \leq$ 3 min
- automatic test: $t_2 \leq$ 0,5 min

– Number of cycles: 20

7 Details to be specified

The following details shall be specified in the relevant specification:

– manual or automatic test;

– low temperature T_A, high temperature T_B and ΔT;

– duration of exposure t_1;

– initial examinations, measurements and performance requirements;

– examinations, measurements during test and performance requirements;

– final examinations, measurements and performance requirements;

– deviations from test procedure;

– additional pass/fail criteria.

Annex A
(informative)

Minimum temperature value in Finland

The minimum temperature value in performance category (O, E, A and G) of IEC 61753-1 shall be –45 °C in Finland. This temperature range shall be used especially with those fibre optic passive components installed in unheated street cabinets and cable joint closures in manholes, in the ground or in telephone poles.