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Optical fibres – **iTeh STANDARD PREVIEW**
Part 1-52: Measurement methods and test procedures – Change of temperature
tests
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IEC 60793-1-52:2014
Fibres optiques –
Partie 1-52: Méthodes de mesure et procédures d'essai – Essais de variations de
température





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CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references	5
3 Apparatus.....	5
3.1 Chamber.....	5
3.2 Other apparatus.....	5
4 Sampling and specimens	6
5 Procedure.....	6
5.1 General.....	6
5.2 Optical measurements	6
5.3 Conditioning.....	6
5.4 Recovery	7
6 Pass/fail criteria.....	7
7 Results.....	7
7.1 Information to be provided with each test.....	7
7.2 Information to be available upon request.....	7
8 Specification information	7

[IEC 60793-1-52:2014](https://standards.iteh.ai/catalog/standards/sist/9c020f30-1b51-4eda-8a4f-1aec47c987ac/iec-60793-1-52-2014)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRES –

**Part 1-52: Measurement methods and test procedures –
Change of temperature tests**

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International Standard IEC 60793-1-52 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition, published in 2001, and constitutes a technical revision.

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

- harmonizing the content with sectional specifications of relevant fibre types;
- extending the applicability of the document to class C single-mode fibres.

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

CDV	Report on voting
86A/1528/CDV	86A/1574/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.

A list of all parts in the IEC 60793 series, published under the general title *Optical fibres*, 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

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OPTICAL FIBRES –

Part 1-52: Measurement methods and test procedures – Change of temperature tests

1 Scope

This part of IEC 60793 provides a practical method for evaluating fibre performance in a defined environment.

The purpose of this standard is to define a test that determines the suitability of sub-category A1a to A1d multimode fibres and class B and C single-mode fibres to withstand the environmental condition of change in temperature which may occur in actual use, storage and/or transport. The test is primarily intended to permit the observation of effects of change of temperature over a given period. This procedure is conducted in accordance with IEC 60068-2-14, Test Nb.

NOTE The applicability of this test to other fibre categories is under study.

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

IEC 60793-1-40:2001, *Optical fibres – Part 1-40: Attenuation measurement methods*

IEC 60793-2-10, *Optical fibres – Part 2-10: Product specifications – Sectional specification for category A1 multimode fibres*

IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

IEC 60793-2-60, *Optical fibres – Part 2-60: Product specifications – Sectional specification for class C single-mode intraconnection fibres*

3 Apparatus

3.1 Chamber

The apparatus consists of an environmental chamber in accordance with IEC 60068-2-14, Test Nb. The chamber shall be capable of housing the specimen and of allowing measurement during conditioning. It shall also be capable of maintaining the specified temperatures within the specified tolerances. Forced air circulation may be used to maintain homogeneous conditions. The chamber and accessories shall be constructed and arranged in such a manner as to avoid condensation dripping on the specimen.

3.2 Other apparatus

Additional apparatus may be necessary to perform the examinations and measurements (or as specified in the detail specification).

4 Sampling and specimens

To ensure the required repeatability on optical measurements, the length of the specimen shall be at least 1 000 m for fibre sub-categories A1a to A1d, and at least 2 000 m for fibre class B and C. The amount of the specimen outside of the test chamber shall be minimized, and if it exceeds 10 % of the overall specimen length, this should be reported.

The preparation of the specimen shall have no detrimental effect on the fibre whilst under test conditions. Unless otherwise specified, the fibre sample should be loosely coiled and dusted with a material such as talcum powder, to allow the coils to move freely against each other. The specimen may be coiled horizontally or vertically, with a minimum bend diameter of 150 mm to avoid any macrobend effects.

A control length of the specimen shall be removed prior to the test to enable the completion of required mechanical measurements for comparison to measurements made after the test. This control length should not be dusted.

5 Procedure

5.1 General

The specimen is placed in a chamber and subjected to changes in temperature for a specified duration, as specified in the detail specification. Conduct the procedure in accordance with IEC 60068-2-14, Test Nb, with the following conditions:

Description	IEC 60068-2-14 nomenclature	Nominal values
Pre-conditioning	Pre-conditioning	2 h at 23 °C/50 % RH
Minimum temperature	TA	-60 °C (see note 1)
Maximum temperature	TB	+85 °C (see note 2)
Minimum dwell time at each temperature	t1	2 h
Maximum speed at which to change the temperature	Ramp rate	1 °C/min
Number of complete cycles required	Number of cycles	2
NOTE 1 In some regions, -40 °C may be acceptable.		
NOTE 2 In some regions, +70 °C may be acceptable.		

5.2 Optical measurements

Attenuation measurement shall be carried out at the wavelengths specified in the relevant specification using either IEC 60793-1-40:2001, Annex B (insertion loss) or IEC 60793-1-40:2001, Annex C (backscattering) before, during (once the specimen has stabilized at the specified temperature) and after the test. Attenuation changes shall be recorded.

Other optical measurements may be required if specified in the relevant product specification.

5.3 Conditioning

Stabilize the chamber and the specimen to standard atmospheric conditions prior to the reference measurements being taken.

Adjust the chamber temperature and humidity to the specified severity. The maximum rate of change of temperature shall be 1 °C/min, averaged over a maximum period of 5 min. Allow the specimen to reach temperature stability and maintain the temperature and humidity for the duration specified.

At the completion of the test, allow the specimen to remain in the chamber while the temperature is reduced to standard atmospheric conditions. The maximum rate of change of temperature shall be 1 °C/min, averaged over a maximum period of 5 min. The detail specification may call for measurements during conditioning. If required, the detail specification shall specify the measurements to be taken and when to take them. Do not remove the specimen(s) from the chamber whilst these measurements are being made.

5.4 Recovery

Unless otherwise required by the relevant specification, the specimen shall remain under standard atmospheric condition for recovery for a period greater than 1 h but not more than 24 h. The detail specification may call for measurements during recovery. If required, the detail specification shall specify the measurements to be taken and when to take them.

6 Pass/fail criteria

The applicable specification limits can be found in the relevant sectional specification of IEC 60793-2-10 for A1 fibres, IEC 60793-2-50 for B fibres and IEC 60793-2-60 for C fibres.

7 Results

7.1 Information to be provided with each test

- date and title of test;
 - identification of specimen;
 - length of specimen;
 - nominal wavelength(s) at which the test was performed;
 - attenuation change;
- <https://standards.iteh.ai/catalog/standards/sist/9c020f30-1b51-4eda-8a4f-1aec47c987ac/iec-60793-1-52-2014>

7.2 Information to be available upon request

- description of all key equipment;
- temperature cycle details.

8 Specification information

The detail specification shall specify the following information:

- values of T_A and T_B used;
 - pass/fail criteria;
 - information to be reported;
 - any deviations to the procedure that apply.
-