

INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

**Dispositifs d'interconnexion et composants passifs à fibres optiques –
Méthodes fondamentales d'essais et de mesures –
Partie 2-1: Essais – Vibrations (sinusoïdales)**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2009 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

www.iec.ch/online_news/justpub

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch

Tel.: +41 22 919 02 11

Fax: +41 22 919 03 00

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,...). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: www.iec.ch/online_news/justpub

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:

Email: csc@iec.ch

Tél.: +41 22 919 02 11

Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

Dispositifs d'interconnexion et composants passifs à fibres optiques – Méthodes fondamentales d'essais et de mesures – Partie 2-1: Essais – Vibrations (sinusoïdales)

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

H

ICS 33.180.20

ISBN 978-2-88910-487-1

CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references.....	5
3 General description.....	5
4 Apparatus.....	5
4.1 General.....	5
4.2 Vibration generator.....	6
4.3 Mounting fixture.....	6
4.4 Measuring equipment.....	6
5 Procedure.....	6
5.1 Preparation of DUT.....	6
5.2 Pre-conditioning.....	6
5.3 Initial measurement.....	6
5.4 Conditioning.....	6
5.5 Monitoring.....	6
5.6 Recovery.....	7
5.7 Final measurements.....	7
6 Severity.....	7
7 Details to be specified.....	8
Figure 1 – Example of vibration apparatus.....	7
Table 1 – Connectors and passive components.....	8
Table 2 – Closures.....	8

iTeH STANDARD PREVIEW
(standards.iteh.ai)

[IEC 61300-2-1:2009](#)

[https://standards.iteh.ai/catalog/standards/sist/1cbbe194-5af7-4fd4-bf0b-](https://standards.iteh.ai/catalog/standards/sist/1cbbe194-5af7-4fd4-bf0b-388971e3501c-61300-2-1-2009)

[388971e3501c-61300-2-1-2009](#)

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC INTERCONNECTING DEVICES
AND PASSIVE COMPONENTS –
BASIC TEST AND MEASUREMENT PROCEDURES –****Part 2-1: Tests –
Vibration (sinusoidal)**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61300-2-1 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This third edition of IEC 61300-2-1 cancels and replaces the second edition published in 2003 and constitutes a technical revision. Changes from the previous edition are to reconsider the severity and the structure of this standard.

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

FDIS	Report on voting
86B/2862/FDIS	86B/2903/RVD

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 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 publication will remain unchanged until the maintenance result 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.

iTeh STANDARD PREVIEW

The contents of the corrigendum of January 2010 have been included in this copy.

IEC 61300-2-1:2009

IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

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

Part 2-1: Tests – Vibration (sinusoidal)

1 Scope

This part of IEC 61300 evaluates the effects of vibration on fibre optic devices at the predominant frequency ranges and magnitudes that may be encountered during field service.

NOTE Most vibrations encountered in service are not of a simple harmonic nature. However, it has been shown that tests based on vibrations of this type are satisfactory to simulating actual service.

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 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

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*

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

3 General description

This procedure is derived from IEC 60068-2-6, test Fc. The device under test (DUT) is mounted on a vibration generator and vibrated with a sinusoidal motion. The DUT is exposed to vibration in three mutually perpendicular directions, one of which is parallel to the optical axis. The vibration amplitude is specified either in terms of constant displacement or constant acceleration.

4 Apparatus

4.1 General

The apparatus shall be in accordance with IEC 60068-2-6, test Fc and consists of the following elements.

4.2 Vibration generator

A vibration generator capable of generating a sinusoidal excitation and its auxiliary test equipment.

4.3 Mounting fixture

A suitable DUT mounting fixture capable of transmitting the vibration conditions specified shall be used. The mounting fixture shall be designed so that the resonant vibration inherent in the fixture shall not have an effect on the specified frequency range. The amplitude and the acceleration of the applied vibration shall be monitored on the test fixture near the DUT mounting points.

4.4 Measuring equipment

Unless otherwise specified, measuring equipment specified in IEC 61300-3-3 shall be connected to the DUT for monitoring the optical performances during the test; moreover the transient loss measuring equipment specified in IEC 61300-3-28 shall be used to detect fast variation of attenuation.

5 Procedure

5.1 Preparation of DUT

Prepare the DUT according to the manufacturer's instructions or as specified in the relevant specification.

5.2 Pre-conditioning

Pre-condition the DUT for 2 h at the standard test conditions specified in IEC 61300-1, unless otherwise specified in the relevant specification.

5.3 Initial measurement

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

5.4 Conditioning

The DUT shall be mounted rigidly to the fixture in a manner that simulates normal mounting as closely as possible. A minimum of 200 mm of optical fibre/cable shall be unsupported on both ends of the DUT and be attached free of tension to the vibrating surface. Conduct the procedure in accordance with IEC 60068-2-6, test Fc. The DUT shall be vibrated in three mutually perpendicular axes coincident with the principal axes of the device. If the sample has axial symmetry the number of axes to be tested can be reduced to two. The vibration endurance shall be performed by sweeping continuously between minimum and maximum frequency at a specified rate. An example of vibration apparatus test is outlined in Figure 1.

5.5 Monitoring

The attenuation and/or return loss of the DUT shall be monitored during the test using an x-y-plotter, an oscilloscope or/and a digital data acquisition system for recording as described in IEC 61300-3-28, unless otherwise specified in the relevant specification. Any change in optical performance shall be within the limit given in the relevant specification.

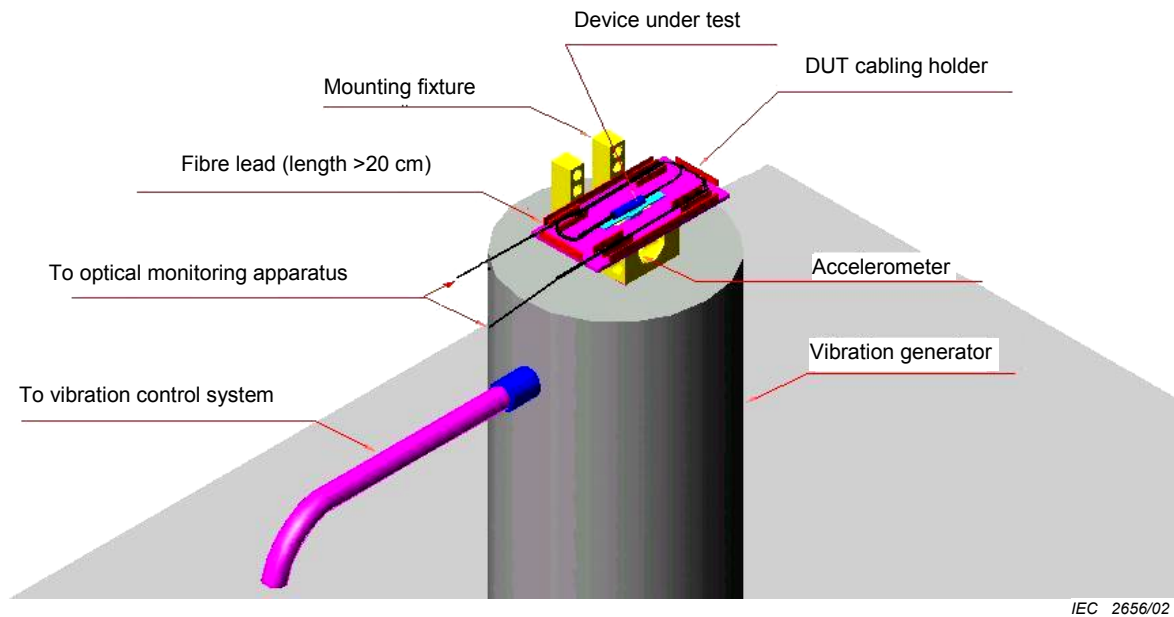


Figure 1 – Example of vibration apparatus

5.6 Recovery

Allow the DUT to remain under standard test conditions for 2 h, as defined in IEC 61300-1, unless otherwise specified in the relevant specification. Clean the DUT in accordance with the manufacturer's instructions.

[IEC 61300-2-1:2009](https://standards.iteh.ai/catalog/standards/sist/1cbbe194-5af7-4fd4-bf0b-6869717e3c6c/iec-61300-2-1-2009)

[https://standards.iteh.ai/catalog/standards/sist/1cbbe194-5af7-4fd4-bf0b-](https://standards.iteh.ai/catalog/standards/sist/1cbbe194-5af7-4fd4-bf0b-6869717e3c6c/iec-61300-2-1-2009)

5.7 Final measurements

[6869717e3c6c/iec-61300-2-1-2009](https://standards.iteh.ai/catalog/standards/sist/1cbbe194-5af7-4fd4-bf0b-6869717e3c6c/iec-61300-2-1-2009)

On completion of the test, remove all fixtures and make final measurements, as defined by the relevant specification, to ensure that there is no permanent damage to the DUT. The results of the final measurement shall be within the limit established in the relevant specification.

Unless otherwise specified, visually examine the DUT in accordance with IEC 61300-3-1. Check for evidence of any degradation in the DUT. This may include, for example:

- broken, loose or damaged parts or accessories;
- breaking or damage to the cable jacket, seals, strain relief, or fibres;
- displaced, bent, broken or chipped parts.

6 Severity

The severity consists of the combination of frequency range, vibration amplitude, sweep rate and either number of sweeps or endurance duration per axis. The severity shall be specified in the relevant specification. Recommended values of the test parameters are given below in Table 1 and 2.

Table 1 – Connectors and passive components

Category	Parameter	Value
Categories C, U and E	Frequency range	10 Hz– 55 Hz
	Sweep rate	1 oct/min
	Number of sweeps	15/axis
	Amplitude	0,75 mm
Category O	Frequency range	10 Hz – 55 Hz
	Sweep rate	1 oct/min for passive components 45 Hz/min for connectors
	Duration	2 h/axis
	Amplitude	1,52 mm for passive components 0,75 mm for connectors

Table 2 – Fibre management systems and closures

Category	Parameter	Value
Categories C, A, G and S	Frequency range	5 Hz – 500 Hz
	Sweep rate	1 oct/min
	Number of sweeps	10/axis
	Amplitude	3,5 mm below 9 Hz
	Acceleration	9,8 m/s ² above 9 Hz

7 Details to be specified

The following details, as applicable, shall be specified in the relevant specification:

- frequency range;
- vibration amplitude;
- number of sweeps;
- endurance duration per axis;
- frequency change at constant rate;
- initial examinations and measurements and performance requirements;
- examinations and measurements during test and performance requirements;
- final examinations and measurements and performance requirements;
- deviations from test procedure;
- additional pass/fail criteria.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[IEC 61300-2-1:2009](#)

<https://standards.iteh.ai/catalog/standards/sist/1cbbe194-5af7-4fd4-bf0b-6869717e3c6c/iec-61300-2-1-2009>