

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Fibre optic interconnecting devices and passive components –  
Basic test and measurement procedures –  
Part 2-9: Tests – Shock**

**Dispositifs d'interconnexion et composants passifs à fibres optiques –  
Méthodes fondamentales d'essais et de mesures –  
Partie 2-9: Essais – Chocs**



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2010 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](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://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](http://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 It also gives information on projects, withdrawn and replaced publications.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](http://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.

- Electropedia: [www.electropedia.org](http://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](http://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](mailto: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](http://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](http://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](http://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](http://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](mailto: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 2-9: Tests – Shock**

**Dispositifs d'interconnexion et composants passifs à fibres optiques –  
Méthodes fondamentales d'essais et de mesures –  
Partie 2-9: Essais – Chocs**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE  
CODE PRIX

H

ICS 33.180.20

ISBN 978-2-88912-214-1

## CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references.....	5
3 General description.....	5
4 Apparatus.....	5
4.1 Shock machine.....	5
4.2 Mounting fixture.....	6
4.3 Measuring equipment.....	6
5 Procedure.....	6
5.1 Preparation of DUT.....	6
5.2 Pre-conditioning.....	6
5.3 Initial measurements.....	6
5.4 Conditioning.....	6
5.5 Recovery.....	6
5.6 Final measurements.....	6
6 Severity.....	7
7 Details to be specified.....	8
Table 1 – Passive components and modules.....	7
Table 2 – Fibre management systems and closures.....	7

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

**Part 2-9: Tests – Shock**

**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 61300-2-9 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition, published in 1995, and constitutes a technical revision. Specific technical changes from the previous edition are to reconsider the apparatus, procedure and severity.

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

FDIS	Report on voting
86B/3068/FDIS	86B/3100/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 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.

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

[IEC 61300-2-9-2010](https://standards.iteh.ai/catalog/standards/sis/9aba90f5-5fe5-48ff-b25f-c9f000c09231/iec-61300-2-9-2010)

<https://standards.iteh.ai/catalog/standards/sis/9aba90f5-5fe5-48ff-b25f-c9f000c09231/iec-61300-2-9-2010>

Withdrawn

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

## Part 2-9: Tests – Shock

### 1 Scope

This part of IEC 61300 defines a test method to reveal eventual mechanical weakness and/or degradation of fibre optic devices when subjected to non-repetitive mechanical shocks. It simulates infrequent non-repetitive shocks likely to be encountered in normal service or during transportation.

### 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 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

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

A device under test (DUT) is mounted on the table of the shock-testing machine and is subjected to half-sinusoidal shock pulses. The DUT is exposed to two or three shock pulses applied in each direction of three mutually perpendicular axes. The test is conducted in accordance with IEC 60068-2-27.

### 4 Apparatus

#### 4.1 Shock machine

The shock machine may be of the free fall, resilient rebound, nonresilient, hydraulic, compressed gas or other activating types. A shock testing machine is capable of generating a half-sinusoidal excitation. The shock machine shall be capable of generating a calibrated acceleration.

## 4.2 Mounting fixture

A suitable DUT mounting fixture capable of transmitting the half sinusoidal shock pulse conditions shall be specified. The DUT shall be prepared and mounted with accessories as specified in the relevant specification and fastened to the table of the shock testing machine.

## 4.3 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; if required, the transient loss measuring equipment specified in IEC 61300-3-28 shall be used to detect fast variation of attenuation.

NOTE The monitoring equipment specified in IEC 61300-3-3 has some limitations to respond to fast transitory changes in attenuation; where detection of transient losses with duration less than a half second is required the measuring equipment specified in IEC 61300-3-28 should be used.

## 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 2h at the standard test conditions specified in IEC 61300-1 unless otherwise specified in the relevant specification.

### 5.3 Initial measurements

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 table of a shock testing machine. Conduct the procedure in accordance with IEC 60068-2-27, test Ea. Shocks shall be applied to the DUT in each direction of three mutually perpendicular axes, that is a total of 12 or 18 shocks.

The attenuation and/or return loss of the DUT shall be monitored during the test as described in IEC 61300-3-3 unless otherwise specified in the relevant specification. Any change in optical performance shall be within the limits given in the relevant specification.

### 5.5 Recovery

Allow the DUT to remain under standard atmospheric conditions for 1 min, as defined in IEC 61300-1, unless otherwise specified in the relevant specification.

### 5.6 Final measurements

On completion of the test, remove all fixtures, clean the DUT in accordance with the manufacturer's instruction and inspect the DUT 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;
- broken or damaged to the cable sheath, seals, strain relief, or fibres;
- displaced, bent, broken or chipped parts.

## 6 Severity

The severity consists of the combination of peak acceleration and number of shocks. The severity shall be specified in the relevant specification. Recommended values of the test parameters are given below:

**Table 1 – Passive components and modules**

Parameter	Value
Wave form	Half sinusoidal
Acceleration	Components: 5 000 m/s <sup>2</sup>  Modules: 2 000 m/s <sup>2</sup> for: 0,125 kg ≤ module mass ≤ 0,225 kg 500 m/s <sup>2</sup> for: 0,225 kg ≤ module mass ≤ 1 kg
Duration	1 ms
Number of shocks	2 directions, 2 shocks per axis
Number of axes	3 mutually perpendicular

**Table 2 – Fibre management systems and closures**

Parameter	Value
Wave form	Half sinusoidal
Acceleration	150 m/s <sup>2</sup>
Duration	11 ms
Number of shocks	2 directions, 3 shocks per axis
Number of axes	3 mutually perpendicular

## 7 Details to be specified

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

- 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 61300-2-9:2010

<https://standards.iteh.ai/catalog/standards/sis/9aba90f5-5fe5-48ff-b25f-c9f000c09231/iec-61300-2-9-2010>

Witholdrawn

Withhold

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

IEC 61300-2-9:2010

<https://standards.iteh.ai/catalog/standards/siso/9aba90f5-5fe5-48ff-b25f-c9f000c09231/iec-61300-2-9-2010>