

INTERNATIONAL STANDARD

Fixed folding durability test method for flexible opto-electric circuit boards

Sample Document

get full document from standards.iteh.ai



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2026 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.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
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 corrigendum or an amendment might have been published.

IEC publications search -

webstore.iec.ch/advsearchform

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 It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD	2
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Method theory	5
5 Apparatus	5
5.1 Fixed folding durability tester	5
5.2 Laser source	6
5.3 Photo detector	6
5.4 Folding jig	6
5.4.1 General	6
5.4.2 Free tension loading jig	7
5.4.3 Tension loading jig	7
5.5 Data acquisition device	7
5.6 Test chamber	7
6 Test sample	7
7 Procedures	8
7.1 Preparing the test sample	8
7.2 Initial optical and electrical performance measurement	9
7.3 Setting the test sample	9
7.3.1 General	9
7.3.2 Setting the test sample with free tension loading	9
7.3.3 Setting the test sample with tension loading	10
7.4 Flexibility measurement	11
7.4.1 General	11
7.4.2 Test method with free tension loading	11
7.4.3 Test method with tension loading	11
7.5 Final optical and electrical performance measurement	11
7.6 Mechanical performance measurement	11
8 Report	12
Annex A (informative) Guideline for the fixed folding durability tester for multi-fibre lines	13
Annex B (informative) Test system to simultaneously accommodate various test conditions	14
Bibliography	15
Figure 1 – Schematic diagram of FOECB (side view)	4
Figure 2 – Concept for fixed folding durability test method of test sample	5
Figure 3 – Concept of fixed folding durability tester for single fibre line	6
Figure 4 – Schematic diagram of FOECB test samples of optic fibre-types	8
Figure 5 – Test jig for free tension loading	10
Figure 6 – Test jig for tension loading	10
Figure A.1 – Concept of fixed folding durability tester for multi-fibre lines	13
Figure B.1 – Test system that simultaneously accommodate various test conditions	14

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**Fixed folding durability test method for
flexible opto-electric circuit boards**

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63516 has been prepared by IEC technical committee 91: Electronics assembly technology. It is an International Standard.

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

Draft	Report on voting
91/2125/FDIS	91/2147/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.

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

- reconfirmed,
- withdrawn, or
- revised.

Sample Document

get full document from standards.iteh.ai

1 Scope

This document defines the test method for providing uniform quality fixed folding durability test data to opto-electric wiring users. In particular, it provides a test condition for the tension and free tension folded state of the flexible opto-electric circuit boards of optic fibre type.

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 62496-2-1, *Optical circuit boards - Part 2-1: Measurements - Optical attenuation and isolation*

IEC 60068-1, *Environmental testing - Part 1: General and guidance*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

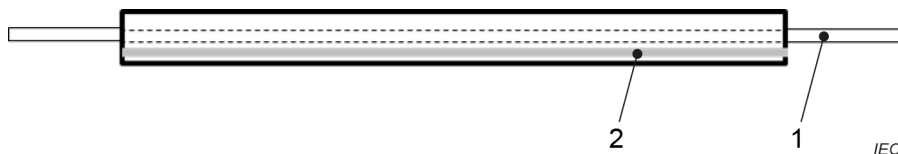
ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

flexible opto-electric circuit board FOECB

flexible circuit board that contains both optic and electric circuits integrated into a flexible sheet



Key

- 1 optic circuit
- 2 electric circuit

Figure 1 – Schematic diagram of FOECB (side view)

Note 1 to entry: Figure 1 shows an example of the top view of a flexible opto-electric circuit board.

3.2

fixed folding durability limit time

total time taken for a test specimen to fail under certain fixed folded conditions

4 Method theory

The fixed folding tester is a device that maintains a test sample composed of optic fibres and electric circuits in a fixed-folded state for a long time. This test system is a device for monitoring changes in optical signals flowing through the test sample and evaluating the durability of the test sample over time. If the test sample is kept in the fixed-folded state for a long time with a jig (cylindrical bar) in the tester, the deterioration of the optic fibre will gradually progress over time and then breaks at a certain time. If the test sample is damaged, the flow of the optical signal in the test system is cut off, and the intensity of the electrical signal at the output end of the photo detector can be lowered to near zero. The flow process of this optical signal is checked through the PC monitor in the test system, and it is confirmed that the test sample used for the fixed folding test can be in a state that can no longer be used at a certain point or more. See Figure 2.

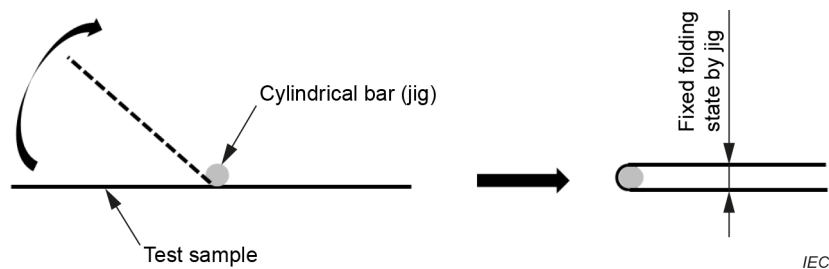


Figure 2 – Concept for fixed folding durability test method of test sample

5 Apparatus

5.1 Fixed folding durability tester

The fixed folding durability tester for single fibre line (hereafter test system) shall be composed of a laser source, a test sample, a photo detector and a data acquisition device.

The optic cable shall be used to connect the laser source and the photo detector centered on the test sample. Besides, the connection between the photo detector and the data acquisition device (composed of multi meter and the PC) uses an electric cable (see Figure 3).

Here, the optical wavelength of the laser source and the photo detector should be selected according to the use of the test sample or the user's needs.

The operating principle of the test system is as follows. The optical signal emitted from the laser source is transmitted to the photo detector through the test sample through the optical cable, where it is converted into an electrical signal (voltage or current). Here, the intensity of the electrical signal at the output terminal of the photo detector is proportional to the intensity of the optical signal passing through the test sample, and these measured values are recorded through the data acquisition device, including personal computer (hereafter PC).