IEC 62715-6-1

Edition 2.0 2018-04

REDLINE VERSION

colour inside

Flexible display devices –
Part 6-1: Mechanical ~~stress~~ test methods – Deformation tests

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.120

ISBN 978-2-8322-5629-9

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

® Registered trademark of the International Electrotechnical Commission

CONTENTS

FOREWORD 4
1 Scope 6
2 Normative references 6
3 Terms and definitions 6
4 Standard atmospheric conditions 6
5 ~~Evaluations – Visual evaluation of panel image quality~~ Specimen preparation 7
5.1 General 7
5.2 Sample preparation 7
6 Mechanical stress test methods 7
6.1 General 7
6.2 Cyclic bending test 8
6.2.1 General 8
6.2.2 Purpose 8
6.2.3 Test apparatus 8
6.2.4 Test procedure 9
6.2.5 Testing conditions and reporting 9
6.3 Static bending test 12
6.3.1 General 12
6.3.2 Purpose 12
6.3.3 Test apparatus 12
6.3.4 Test procedure 12
6.3.5 Testing conditions and reporting 13
6.4 Combined bending test 12
6.4.1 General 13
6.4.2 Purpose 13
6.4.3 Test apparatus 13
6.4.4 Test procedure 14
6.4.5 Testing conditions and reporting 15
6.5 Rolling test 15
6.5.1 General 15
6.5.2 Purpose 16
6.5.3 Test apparatus 16
6.5.4 Test procedure 18
6.5.5 Testing conditions and reporting 18
6.6 Static rolling test 18
6.6.1 General 19
6.6.2 Purpose 19
6.6.3 Test apparatus 19
6.6.4 Test procedure 19
6.6.5 Testing conditions and reporting 20
6.7 Torsion test 20
6.7.1 General 20
6.7.2 Purpose 20
6.7.3 Test apparatus 20
6.7.4 Test procedure 20
6.7.5 Testing conditions and reporting 22

6.8 Tension test 20
6.8.1 General 23
6.8.2 Purpose 23
6.8.3 Test apparatus 23
6.8.4 Test procedure 23
6.8.5 Testing conditions and reporting 24
Bibliography 25

Figure 1 – Apparatus for diverse cyclic bending tests 11
Figure 2 – Apparatus for static bending test 12
Figure 3 – Apparatus for combined bending tests consisting of the cyclic bending test and static bending test 15
Figure 4 – Apparatus for rolling test 17
Figure 5 – Apparatus for diverse torsion tests 22
Figure 6 – Apparatus for tension test 24

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

FLEXIBLE DISPLAY DEVICES –

Part 6-1: Mechanical ~~stress~~ test methods – Deformation tests

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.

DISCLAIMER
This Redline version is not an official IEC Standard and is intended only to provide the user with an indication of what changes have been made to the previous version. Only the current version of the standard is to be considered the official document.

This Redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 62715-6-1 has been prepared by IEC technical committee 110: Electronic display devices.

This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision.

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

a) changed the part title to differentiate it from other parts;
b) added new bending testing methods;
c) added detailed testing procedures.

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

FDIS	Report on voting
110/951/FDIS	110/974/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 62715 series, under the general title *Flexible display devices*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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 document using a colour printer.

FLEXIBLE DISPLAY DEVICES –

Part 6-1: Mechanical ~~stress~~ test methods – Deformation tests

1 Scope

The object of this part of IEC 62715 is to define the standard test methods to evaluate the mechanical stability of flexible display modules, specifically mechanical stability against deformation, such as bending, rolling, twisting, and stretching. Display modules include displays such as LCD, e-paper, and OLED. This document takes into account, wherever possible, the mechanical test methods outlined under mechanical stress.

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 62341-5:2009, *Organic light emitting diode (OLED) displays – Part 5: Environmental testing methods*

IEC 62715-6-1

Edition 2.0 2018-04

INTERNATIONAL STANDARD

colour inside

Flexible display devices –
Part 6-1: Mechanical test methods – Deformation tests



IEC 62715-6-1:2018-04(en)

CONTENTS

FOREWORD 4
1 Scope 6
2 Normative references 6
3 Terms and definitions 6
4 Standard atmospheric conditions 6
5 Specimen preparation 7
5.1 General 7
5.2 Sample preparation 7
6 Mechanical stress test methods 7
6.1 General 7
6.2 Cyclic bending test 8
6.2.1 General 8
6.2.2 Purpose 8
6.2.3 Test apparatus 8
6.2.4 Test procedure 9
6.2.5 Testing conditions and reporting 9
6.3 Static bending test 11
6.3.1 General 11
6.3.2 Purpose 11
6.3.3 Test apparatus 11
6.3.4 Test procedure 11
6.3.5 Testing conditions and reporting 12
6.4 Combined bending test 12
6.4.1 General 12
6.4.2 Purpose 12
6.4.3 Test apparatus 12
6.4.4 Test procedure 12
6.4.5 Testing conditions and reporting 13
6.5 Rolling test 14
6.5.1 General 14
6.5.2 Purpose 14
6.5.3 Test apparatus 14
6.5.4 Test procedure 15
6.5.5 Testing conditions and reporting 16
6.6 Static rolling test 16
6.6.1 General 16
6.6.2 Purpose 16
6.6.3 Test apparatus 16
6.6.4 Test procedure 17
6.6.5 Testing conditions and reporting 17
6.7 Torsion test 18
6.7.1 General 18
6.7.2 Purpose 18
6.7.3 Test apparatus 18
6.7.4 Test procedure 18
6.7.5 Testing conditions and reporting 19

6.8 Tension test 20
6.8.1 General 20
6.8.2 Purpose 20
6.8.3 Test apparatus 20
6.8.4 Test procedure 20
6.8.5 Testing conditions and reporting 21
Bibliography 22

Figure 1 – Apparatus for diverse cyclic bending tests 10
Figure 2 – Apparatus for static bending test 11
Figure 3 – Apparatus for combined bending tests consisting of the cyclic bending test and static bending test 13
Figure 4 – Apparatus for rolling test 15
Figure 5 – Apparatus for diverse torsion tests 19
Figure 6 – Apparatus for tension test 21

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

FLEXIBLE DISPLAY DEVICES –

Part 6-1: Mechanical test methods – Deformation tests

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 62715-6-1 has been prepared by IEC technical committee 110: Electronic display devices.

This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision.

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

a) changed the part title to differentiate it from other parts;
b) added new bending testing methods;
c) added detailed testing procedures.

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

FDIS	Report on voting
110/951/FDIS	110/974/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 62715 series, under the general title *Flexible display devices*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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 document using a colour printer.

FLEXIBLE DISPLAY DEVICES –

Part 6-1: Mechanical test methods – Deformation tests

1 Scope

The object of this part of IEC 62715 is to define the standard test methods to evaluate the mechanical stability of flexible display modules, specifically mechanical stability against deformation, such as bending, rolling, twisting, and stretching. Display modules include displays such as LCD, e-paper, and OLED. This document takes into account, wherever possible, the mechanical test methods outlined under mechanical stress.

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 62341-5:2009, *Organic light emitting diode (OLED) displays – Part 5: Environmental testing methods*