



INTERNATIONAL STANDARD



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.120

ISBN 978-2-8322-5614-5

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FOREWORD

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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- withdrawn,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.

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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*

5 Specimen preparation

5.1 General

The specimen shall be the display module since the final evaluation has to be made based on panel image quality such as luminance, chromaticity, uniformity, line defect, and point defect. The bending stress may cause the deterioration of image quality on a panel, [1] to [9]¹.

5.2 Sample preparation

For the measurements both before and after the mechanical deformation test, the display module being tested shall be aligned on an appropriate support which has to be a flat surface. In addition, the module for the measurement shall be of the appropriate geometry for mechanical stress testing. Specify that the test apparatus should be designed to prevent added strain by stretching test specimens upon folding.

The preferred method of attachment between the display module and the test apparatus is adhesive transfer tape. The display should be bonded on both sides, and the distance between the centre of the test specimen and the point of attachment should be specified. If use scenarios require it, a clamping attachment may be used instead, in which the display is clamped on one side and allowed to slide on the other. The clamping force should be sufficient to ensure that the test specimen is firmly anchored to the test apparatus throughout the entire duration of the test cycle.

If some modules are difficult to clamp due to narrow edge width, the module should be fixed on a bendable support substrate with a suitable adhesive strip or glue. Neither the adhesive strip nor the glue should affect the measurement.

NOTE In some cases, the testing specimen can have a short length or has a very narrow edge to clamp for mechanical stress testing.

Specify that in the event of cross-instrument variability in the form of location (centre or edge)-response bias, one should investigate bend axis misalignment, bowing or uneven mounting plates.

For precise optical measurements, it is very important to define the alignment of the measurement specimen because the flexible display module can be easily deformed by external force. Measurements of the visual characteristics of a flexible module shall be made in an aligned flat state. If flexible modules are aligned in a curved state, it is difficult to make a precise visual evaluation. The measurement module shall be supported or fixed so that it is flat.

The flatness and size of the specimen shall be determined between the supplier and customer.

6 Mechanical stress test methods

6.1 General

Flexible displays have a diversity of shapes in comparison with any other non-flexible electronic displays. Therefore, a wide variety of mechanical stress test methods are available, such as a cyclic bending (folding) or dynamic bending test, a static bending test, a rolling test, a combined mechanical test and more. The selection of the appropriate test methods shall be based on the requirement of the application. For each mechanical stress test, the relevant test method specification shall be stated along with the explanation of the purpose of each unique test. The allowable critical bending radius of a panel depends on the application of the flexible display. Therefore, the required critical bending radius will be changed based on the applications.

¹ Numbers in square brackets refer to the Bibliography.