



NSAI
Standards

Irish Standard
I.S. EN 61747-5-3:2010

**Liquid crystal display devices -- Part 5-3:
Environmental, endurance and
mechanical test methods - Glass
strength and reliability (IEC 61747-5
-3:2009 (MOD))**

I.S. EN 61747-5-3:2010

Incorporating amendments/corrigenda issued since publication:

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I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

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SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

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EUROPEAN STANDARD

EN 61747-5-3

NORME EUROPÉENNE

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May 2010

ICS 31.120

English version

**Liquid crystal display devices -
Part 5-3: Environmental, endurance and mechanical test methods -
Glass strength and reliability
(IEC 61747-5-3:2009, modified)**

Dispositifs d'affichage à cristaux liquides -
Part 5-3: Méthodes d'essais
d'environnement, d'endurance
et mécaniques -
Résistance et fiabilité du verre
(CEI 61747-5-3:2009, modifiée)

Flüssigkristall-Anzeige-Bauelemente -
Teil 5-3: Verfahren zur Messung
von Glasfestigkeit und Zuverlässigkeit
(IEC 61747-5-3:2009, modifiziert)

This European Standard was approved by CENELEC on 2010-05-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of the International Standard IEC 61747-5-3:2009, prepared by IEC TC 110, Flat panel display devices, together with the common modifications prepared by the CENELEC Reporting Secretariat 110 (NL), was submitted to the CENELEC formal vote and was approved by CENELEC as EN 61747-5-3 on 2010-05-01.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2011-05-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2013-05-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61747-5-3:2009 was approved by CENELEC as a European Standard with the following common modifications.

COMMON MODIFICATIONS

4 Abbreviated terms

Delete:

MC	mirror constant
MR	mirror radius
SCSC	stress corrosion susceptibility constant

8.2 Quasistatic biaxial strength (parent glass)

Replace the title by:

8.2 Quasistatic biaxial failure stress (parent glass)

8.3 Quasistatic edge strength (parent glass)

Replace the title by:

8.3 Quasistatic edge failure stress (parent glass)

Under equation 2, replace the following definition:

σ_e is the edge failure stress.

9 Fatigue and reliability calculations

9.1 General

Replace Equation 3 by:

$$\int_0^{t_F} \sigma^n(t) dt \approx BS^{n-2}$$

Under Equation 3 replace the following definitions:

$\sigma(t)$ is the applied stress over time,
 t_F is the time to failure,

9.2 Fatigue constant calculation

Replace the title by:

9.2 Dynamic fatigue calculation

9.3 Weibull parameter calculation from dynamic failure stress data

Replace the last sentence of the 1st paragraph by:

For each, the effective strength, $Seff_k$ is calculated as

Under Equation 7 add the following definition:

$Seff_0$ is the Weibull scaling factor for $Seff$

9.4 Fatigue constant calculation

Replace the title by:

9.4 Extrapolated static fatigue and Weibull distribution calculation

Replace Equation 8 by:

$$\ln(S_{\text{eff}}) = \frac{n}{n-2} \ln(\sigma_a) + \frac{1}{n-2} \ln(t_F)$$

Replace Equation 9 by:

$$\ln(-\ln(1-F)) + m \ln(S_{\text{eff}_0}) = \frac{mn}{n-2} \ln(\sigma_a) + \frac{m}{n-2} \ln(t_F)$$

Annex A (informative) Worked test example

Replace the sentence under table A.1 by:

The failure stress value can also be estimated by measuring the mirror radius, R_m of the specimen's fracture surface, as shown in Figures A.2 and A.3, and using Equation (A.1).

Add the following note to Equation A.1:

σ_f is the failure stress for a given sample.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61747-1	-	Liquid crystal and solid-state display devices - Part 1: Generic specification	EN 61747-1	-
IEC 61747-5	1998	Liquid crystal and solid-state display devices - Part 5: Environmental, endurance and mechanical test methods	EN 61747-5	1998

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIQUID CRYSTAL DISPLAY DEVICES –

**Part 5-3: Environmental, endurance and mechanical test methods –
Glass strength and reliability**

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.
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International Standard IEC 61747-5-3 has been prepared by IEC technical committee 110: Flat panel display devices.

This International Standard replaces the IEC/PAS 61747-5-3, published in 2007.

There have been no significant revisions since the publication of the PAS version.

This part of IEC 61747 is a sectional specification for liquid crystal display cells. It is to be read in conjunction with the IEC 61747-1 to which it refers.

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

FDIS	Report on voting
110/169/FDIS	110/177/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.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

A list of all parts of the IEC 61747 series, under the general title *Liquid crystal display devices*, 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.

INTRODUCTION

IEC 61747-5-3 facilitates the characterization of mechanical strength properties of LCD modules and their component glass. Analysis and testing are performed on LCD Module component glass as well as finished LCD modules. Statistics of mechanical strength of the modules are determined allowing a prediction of module failure probability at a given stress level or for a given probability of failure, the maximum recommended safe loading stress for the module.

LIQUID CRYSTAL DISPLAY DEVICES –

Part 5-3: Environmental, endurance and mechanical test methods – Glass strength and reliability

1 Scope

This part of IEC 61747 applies to commercially available liquid crystal displays (LCDs). This standard applies to all LCD types, including transmissive, reflective or transflective liquid crystal display (LCD) modules using either segment, passive or active matrix and achromatic or colour type LCDs that are equipped with their own integrated source of illumination or without their own source of illumination.

The objective of this standard is to establish uniform requirements for accurate and reliable measurements of the following LCD parameters:

- a) quasistatic strength,
- b) quasistatic fatigue.

The methods described in this standard apply to all sizes, small and large, liquid crystal displays.

NOTE Methods for measuring the fatigue constant are described in this standard and are taken from the referenced literature, see [13]¹ to [20]. The primary results are formulae for estimated allowable stress for the specified lifetime or estimated failure rate for the specified stress level. As an example, limited data for strength and fatigue behaviour of LCD glass are included in an informative Annex A. Similarly, limited data for static strength of LCD modules are also included and compared with that of parent glass.

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 61747-1, *Liquid crystal and solid-state display devices – Part 1: Generic specification*

IEC 61747-5:1998, *Liquid crystal and solid-state display devices – Part 5: Environmental, endurance and mechanical test methods*

3 Terms and definitions

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

3.1

strength

stress at which a sample fails for a given loading condition

3.2

LCD surface strength

biaxial strength wherein surface flaws with different orientations are subjected to uniform tension during measurement

¹ Figures in square brackets refer to the bibliography.

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